BBC·MASTER·ELECTRON·ARCHIMEDES SEPTEMBER 1989 £1·50

BBC ACORN USER



POWER OF BABEL:
Programming languages

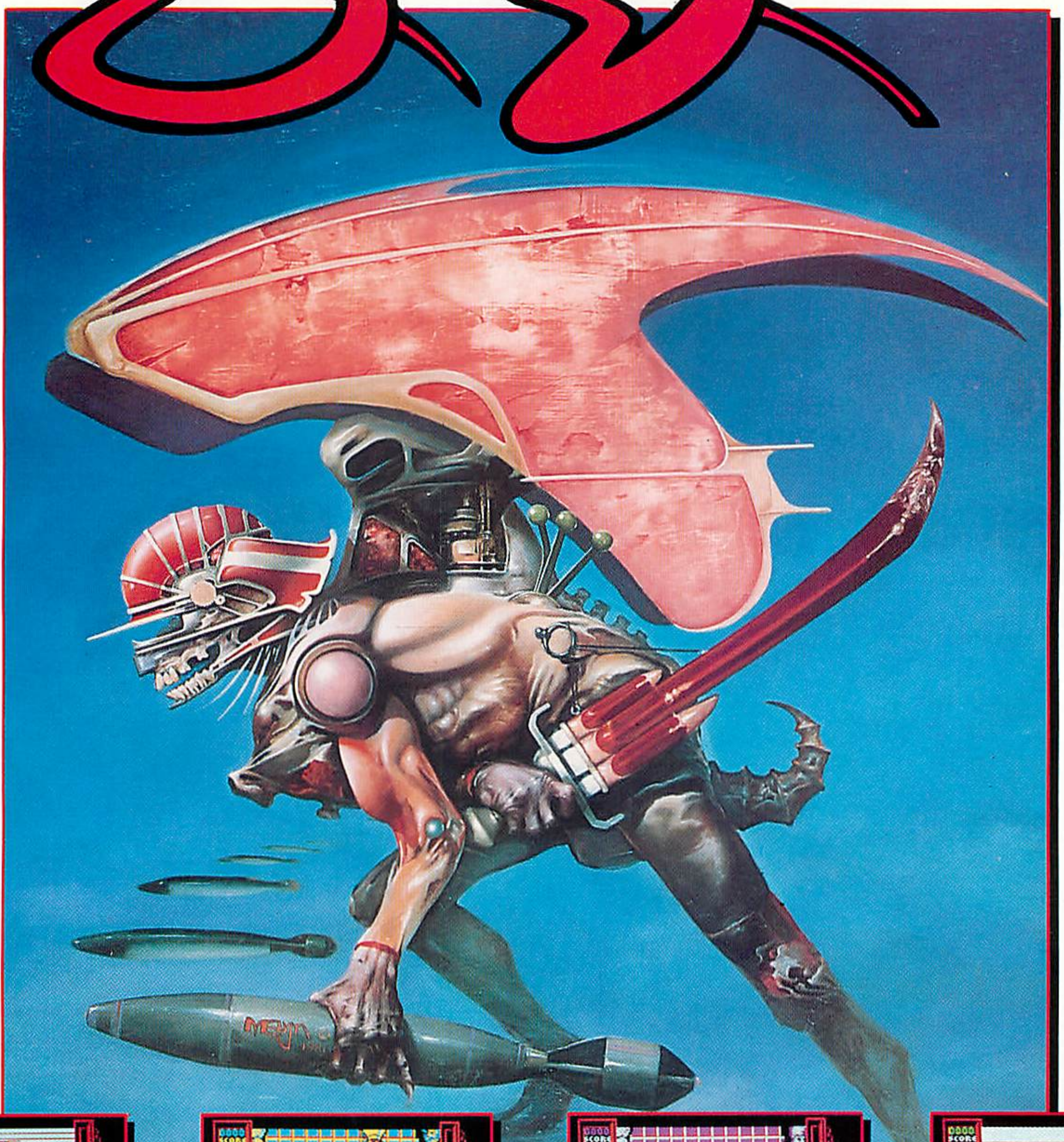
PERFECT PICTURES:
Postscript screen print

C TRIALS:
Real C on the Beeb?

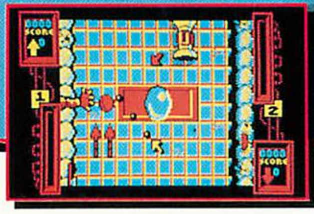
EARTH WORKS

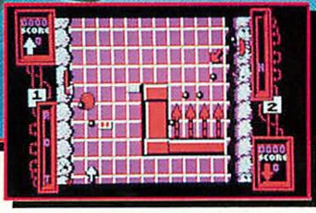
On-screen geology

BALLISTIX











BALLISTIX - It's a whole new ball game!

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BBC Micro Cassette	£9.95	Acorn Electron Cassette	£9.95
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(Compatible with the BBC B, B+ and Master Series computers)

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(The screen pictures show the BBC Micro version of the game.)

GAME FEATURES

The aim of the game is simple enough: score more goals than your opponent to win a match. However there are lots and lots of extra features to contend with as you advance from screen to screen, for example:

- RIDGES to get the balls over,
- SPLITTERS produce extra balls,
- BUMPERS bounce balls all over,
- MAGNETS divert balls from you,
- HOLES for balls to drop down,
- TUNNELS hide balls from view,
- RED ARROWS accelerate balls,
- OIL SLICKS stop balls dead.

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ACORNSOFT

(Acornsoft is a registered trademark of Acorn Computers Ltd. Superior Software Ltd is a registered user.)

Dept BL1, Regent House, Skinner Lane, Leeds LS7 1AX. Telephone:(0532) 459453

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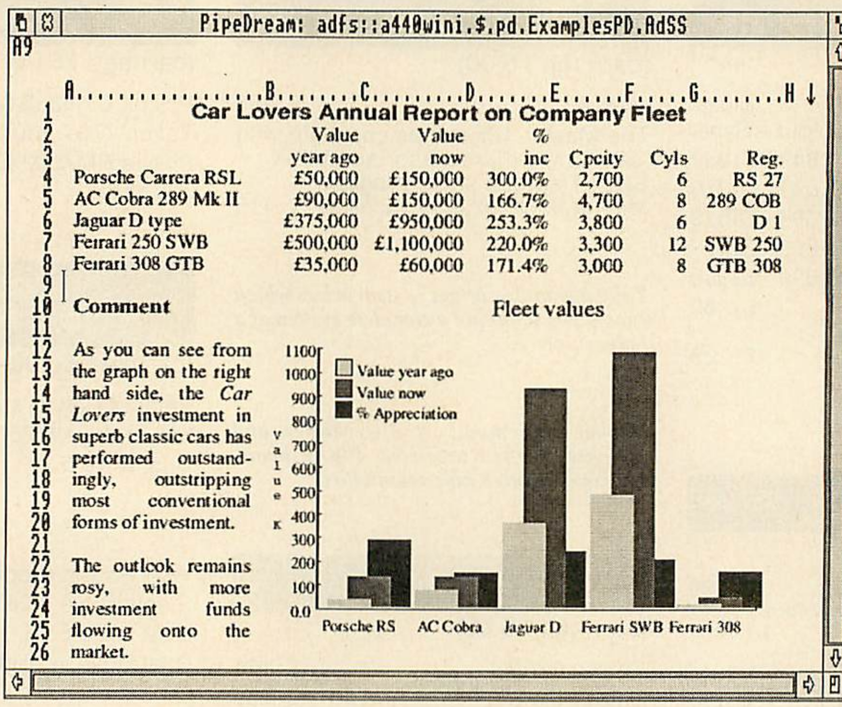
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Based on PipeDream 2, the best-selling integrated package for the Archimedes, PipeDream 3 has been completely re-written to take full advantage of RISC OS - if you can use RISC OS, you can use PipeDream 3. It is fully multi-tasking and multi-windowing, so you can work on many documents at once and instantly move information between them. And since PipeDream 3 can automatically load and save most popular file formats, including VIEW and First Word Plus, switching to it from other programs has never been easier.

Power, flexibility, speed, ease of use. PipeDream 3. Breaking down the barriers.

For a free brochure, see your Archimedes dealer, or phone us on 0954 211472 or return the coupon.

PipeDream 3 is for all Archimedes computers with RISC OS and 1Mbyte of RAM.

PipeDream 3 costs £147.00 +VAT.

Major features include:

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- background recalculation
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- Z88 filing system
- automatic loading of VIEW, ViewSheet, Lotus, First Word Plus, Tab and CSV files
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Fax: 0954 211607 Tel: 0954 211472

All trademarks acknowledged. The chart in the screen shown above was produced by sending numbers from PipeDream 3 to Lingenuity's Presenter 2 and then loading the resulting graph back into PipeDream 3.

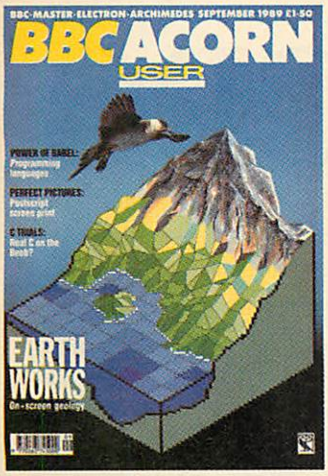
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BBC ACORN USER

ISSUE NO 86 — SEPT 1989

COVER



COVER FEATURE
Form your own surroundings with our landscaping program

Cover by Richard Draper

FEATURES

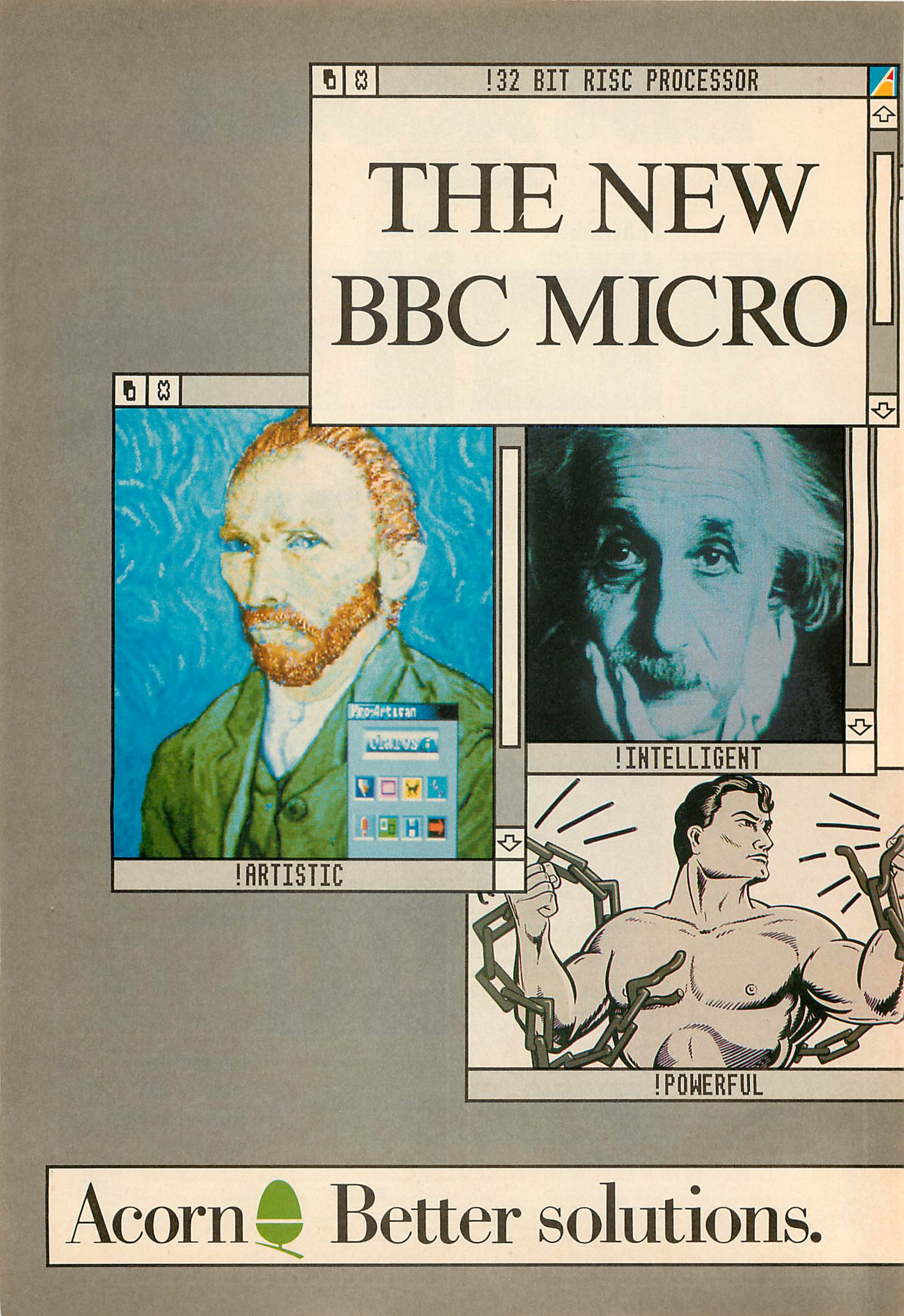
REVIEWS

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THE BBC A3000

!CUT HERE

For further information about the A3000 computer system call this number anytime.

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To Acorn Computers Ltd., FREEPOST (TK960), Brentford, Middlesex TW8 8BR.

☐ Please organise a demonstration with my local dealer.

Please send me the A3000 information pack. I indicate below my area of interest.

☐ Business ☐ Healthcare ☐ Education ☐ Home use ☐ General interest

Name____________________

Company/School/Establishment (if applicable)____________________

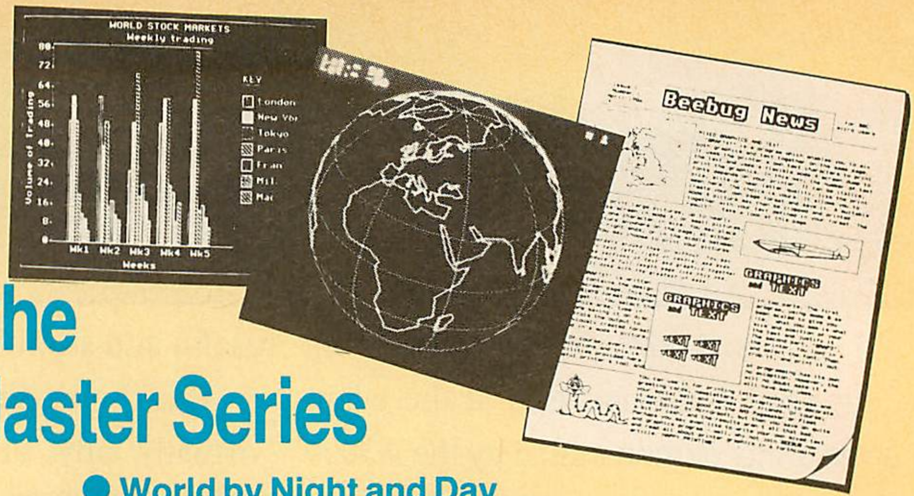
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- **The Earth from Space**
  An impressive graphical display which recreates the world as seen from space.

JUST A FEW OF MANY...

This is just a sample of the many useful programs that subscribers have received free in BEEBUG magazine. Each issue is crammed full of:

- handy utilities
- useful applications
- hints and tips on programming
- communications
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- reviews of all the latest products for your machine
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- games



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The new A3000 BBC Microcomputer
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NEWS

Hauser's Hyperpage



Herman Hauser, founder of Acorn, has started a new company – The Active Book Company – which promises to use the Arm chip to revolutionise computing.

Launched next Autumn, the 'Active Book' will be a portable micro, controlled and written on with the electromagnetic stylus on its LCD screen. It will also 'tape' the spoken word and include a fax modem. Prices will range from about £500 to £1000.

Hauser has spurned the desktop used by the Archimedes and Apple Macintosh and replaced it with what he considers a much friendlier 'book' metaphor, called Hyperpage.

Hauser believes the two most exciting developments in computing, multimedia and portability, come together in the Active Book. 'Part of the vision is size. It's much smaller than anything comparable – the size of a paperback book' he said.

The small size and the lack of a keyboard (although there will be an optional one available) will enable people who would never have used a computer at work to use one.

Carol Atack

New BBC home service



Acorn has appointed a Marketing Manager specially for the home, music and hobby sectors.

Simon Lovesey's appointment follows the launch of the BBC A3000 and his main role will be to ensure Acorn is represented in the home markets with the new machine. Lovesey intends to build Acorn's position with the Archimedes range and capitalise on the company's position as the number one supplier of computers to schools in the United Kingdom.

Commenting on his post, Lovesey said 'the role for a Home Marketing Manager has grown over the years. It was previously carried out by several people.'

Lovesey, who was formerly Product Manager for Amstrad said 'we are not looking to compete head-on with Atari and Commodore. We are addressing the quality end of the market. This includes the music sector where keyboard prices are falling and musicians are looking for a fast, low-cost processor and software for control purposes.'

Although the BBC A3000 is the focus of attention, David Bell, Acorn's product manager said the company will continue to support the Master 128 'for at least a couple of years – while demand lasts'. This also includes customer support for machines such as the BBC micro even though it is no longer in production.

■ Acorn has now ceased production of the Compact.

The machine was first sold in September 1986 and has been popular with Local Education Authorities and foreign markets. Over eighty thousand Compacts and Olivetti's Prodest version have been sold but according to Acorn's Product Manager, David Bell, 'demand has fallen off to a level where Acorn has decided to concentrate on the Master 128 as its core 8-bit machine'.

Acorn is on (0223) 245200.

New workstation from Acorn

Acorn is shortly to launch a successor to the R140 Unix workstation.

The new machine will be equipped with 8Mb of memory – twice that of the R140 – and the new Arm 3 processor. The price is expected to be the same as the R140.

Acorn's Workstation Manager David Slight said 'we wouldn't make such a chip unless we were going to put it into a workstation'.

One of the features of the Arm 3 chip is a 4K on-board cache. This helps to bypass the problems of Ram chips slower than the Arm 3.

The cache is designed with a hit rate approaching 90 percent – there is a 90 percent chance the next item of data will already be in the cache. As a result operations such as screen updating are much faster. Acorn is on (0223) 245200.

■ Acorn has explained its dealer network for the R140 Unix workstation.

A further 17 UK dealers have been appointed by Acorn's distributor Hugh Symons Distribution Services. This brings the total number of R140 dealers to 23.

News in brief

■ The Data Protection Registrar has issued revised versions of the eight Data Protection Guideline booklets.

The booklets inform individuals of their rights and responsibilities under the Data Protection Act. Copies are free from the Registrar on (0625) 535777.

■ Birmingham based Central Technologies Ltd has released its catalogue of computer consumables on disc.

Available on 5.25 or 3.5in PC format only, the disc contains details of all items stocked. For a free disc phone Central Technologies on 021-233 4041.

■ Morley Electronics has produced a version of its Teletext adaptor software which allows IBM users without a teletext adaptor to download telesoftware with a BBC micro. Upgrades cost £9 from Morley on 091-257 6355.

■ Adventure specialist Topologika has released Archimedes compilations of its adventure games. Five discs are available at £19.95 each, and they all contain at least two adventures.

The games are also available separately for the Electron. Details from Topologika on (0733) 244682.

■ Intelligent Interfaces is now supplying a version of its *Termulator* package for the Archimedes at £59 plus VAT.

The package can emulate a VT52, VT102, VT220 or Tektronix Terminal. Intelligent Interfaces is on (0789) 415875.

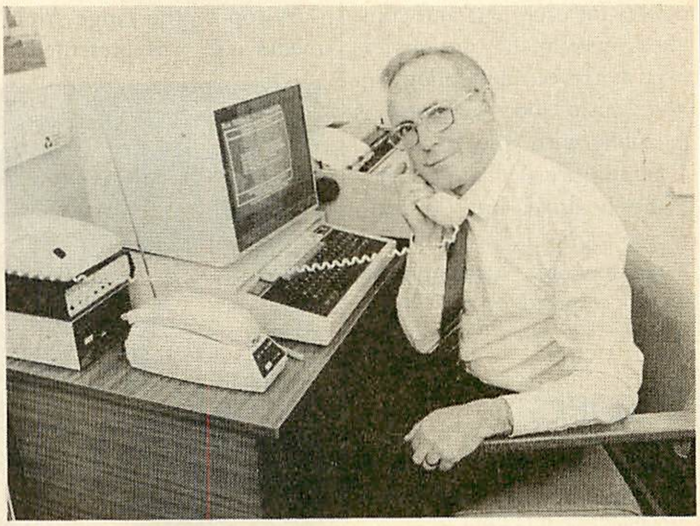
■ Chalk Soft has released *Puncman 5/6/7*. The package extends the existing punctuation course, and covers apostrophes, semi-colons, dashes, colons, brackets and hyphens. Prices are £15 for the BBC model B and Master and £17 for Compact and Archimedes versions. Chalk Soft is on (0775) 69518.

Microlink to move home

Microlink, the electronic magazine for home and small business users on Telecom Gold is to move home from October 1 when it will switch over to a new network operated by Istel and Bell Canada.

Microlink started life on Telecom Gold in 1985, and now claims a subscriber-base exceeding 14,000. According to Derek Meakin, chairman of Europress which operates Microlink, Telecom Gold has been dragging its heels as far as developments are concerned.

'The new network operated by Istel and Bell Canada will enable us to exploit Microlink the way we have wanted to over the last few years', said Meakin.



The changeover will be transparent to users wishing to stay with Microlink, and Meakin hopes to provide his subscribers with free access to the Istel/Bell Canada network until the end of September 'so they can get used to the new network'. Microlink is on (06250) 878888.

Changes to the A3000

Following the reviews of the BBC A3000 in *BAU*, Acorn is to make a number of changes to the production models.

The reset button which is situated underneath the disc drive is to be made smaller in order to avoid an accidental reset, and will require a small finger or pencil to operate it.

The case is to be strengthened in places, and a number of small changes will be made to the clips at the back of the case. Accessing the mouse connector is very difficult as there is little room surrounding the socket. Space will be eased thus making it easier to fit and remove the mouse.

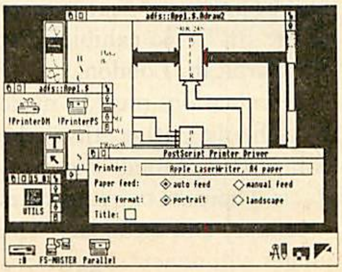
Although the BBC A3000 is a dealer-serviceable machine and the lid should not be removed by end users, one criticism made in the review was the lack of any covering for the PSU. Acorn's Product Manager, David Bell told *BAU* that an insulating material (similar to strengthened cardboard) will cover three sides and the top of the PSU, and is included to protect service engineers.

The changes will be rolled into production over a period of months. Acorn is on (0223) 245200.

Risc changes

Acorn has denied reports that there is to be a new release of Risc OS.

Acorn's Product Manager David Bell told *BAU* that 'Acorn is not in the process of imminently changing the Rom as we are pleased with the state of the current one'.



He did say that enhanced items for Risc OS would be available over a period of time, and that they would be supplied on disc. According to Bell, Acorn has a policy of producing modified printer drivers which will also be made available on disc. Acorn is on (0223) 245200.

Sweet 16

A £100 channel expander has been developed for the Music 5000 synthesiser by Hybrid Technology.

The Music 3000 Expander adds 16 channels of sound to the Music 5000 to make a total of 32. More musical parts, voices for each part and complex instrument designs as well as 16 voice polyphony on the Music 4000 keyboard is possible with the expander. The additional channels may either be mixed into the main stereo outputs, or amplified seperately for quadraphonic sound. Hybrid is on (0223) 420360.

Winners

Congratulations to Mr B A Stefandswki of Smethwick Warley for winning a weekend in London and an A3000. Our July competition winner was presented with his A3000 at the *BBC Acorn User* show on Saturday 22 July.

The correct answers were:

1. The first BBC TV broadcast was made from the Alexandra Palace and the first radio broadcast was made from Marconi House.
2. The first BBC micro was launched in 1981.
3. Acorn's home computer prior to the model A and B was the Atom.
4. 650,000 model A and Bs were made.
5. July/August 1982 was the first issue of *Acorn User*.
6. Jane Fransella was the first editor of *Acorn User*.

Diary Dates

18-19 September. *Educational Networks 89*, Newman College. Conference on computer networking in an educational context. Tel: LTS (0386) 792617.

27 September – 1 October. *Personal Computer Show*, Earls Court, London. Tel: Montbuild, 01-486 1951.

4-6 October. *International Desktop Publishing Show/Presentations 89*, London Arena, Limeharbour, London E14. Tel: Database Exhibitions (0625) 879965.

24-26 November. *The Computer Shopper Show* Alexandra Palace, London. Tel: Database Exhibitions (0625) 878888.

Educating Arc

Pendall Middle School in South East Hampshire was the lucky winner in a prize-draw competition to mark the launch of the *Acorn Computer School Service.*

A top of the range Archimedes 440 was presented to deputy head, Mr Hedley Underwood, by Michael Page, Acorn's corporate communications manager during the school's morning assembly on Friday 7 July.



The 440 will complement the schools six model B and Master 128's.

The *Acorn Computer School Service* provides a programme of updates, information and software support for teachers.

Registration is free, and benefits include copies of the BBC produced documentary *Micro News*, a subscription to Acorn's *Education News* and three months subscription to Acorn's Support Information Database – SID. Acorn is on (0223) 245200.

Tech awards

Readers of *BBC Acorn User*, or *Educational Computing* are invited to take part in an awards scheme to encourage companies producing technology for the education market.

The Educational Technology Awards, now in their second year, are open to any piece of technology – hardware or software – launched in the UK in 1989. The awards will be presented next January at the BETT 90 exhibition at the Barbican, London.

Nominations must be made by schools, rather than the companies behind the products. There are two categories – primary and secondary. The judges will review suggestions and make gold, silver and bronze awards in each catagory. They will be looking at content, originality, design, ease of use, adaptability, value and safety. Schools nominating the winning products will receive a special invitation to BETT 89, VIP treatment when you visit the exhibition plus a certificate for your school. Nominations should be in by October 6 1989. Use the coupon in the June issue of *Educational Computing* or write the details on a sheet of paper and send them to: Educational Technology Awards, Educational Computing, 20-26 Brunswick Place, London N1 6DJ.

Elk bargain board

Software Bargains has just released its own answer to Acorn's old Plus 1. It's called the Rom cartridge and printer interface board.



The board is available in three configurations with one cartridge port, a cartridge port and printer port, or two cartridge ports and a printer port. Prices are £30, £37 and £40 respectively.

View and *Viewsheet* cartridges are supplied with each configuration. Software Bargains can be contacted on (0532) 436300.

Fly with Clares

Computer animations created with an Arc have been completed for a Welsh language quiz show by Clares Micro Supplies.

In HTV's *Lefel 4* (level 4) rival teams fly to a holiday destination using as little fuel as possible by flying at an altitude of 40,000 feet. To fly so high contestants must answer questions relating to air travel.

The animations supplied by Clares include a plane for each team, the questions, scrolling background scenery as well as the scoring.

HTV Director, Richard Arwell said 'the quality of the graphics is excellent and the production team is very impressed with the results'. Clares is on (0606) 48511.

Acorn Computers Ltd. is already established worldwide with its high performance quality computer systems and is the only company in Europe to have developed its own RISC processor. We are constantly striving to improve existing products and have an impressive development programme for new products and new markets. As an Acorn user you may have the skills we need to ensure that our programme stays on course.

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Responsible for the project management and development of internal office automation systems, you will assist with the overall IT strategy development.

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Ref AU/JM/013

HARDWARE/NETWORK SUPPORT SPECIALIST

A graduate calibre Support Specialist with experience of networking and 6502-based products. Excellent communication skills are essential. The successful applicant will provide technical support internally and to distributors, dealers and professional end-users.

Ref AU/JG/008

UNIX AND C SPECIALISTS

Opportunities exist at various levels from Engineer to Section Leader for system software specialists to be engaged in the development of a new UNIX implementation and the provision of Graphics, Utilities, Source Control and Support Tools.

Applicants should have at least two years' experience gained working in 'C' and UNIX, ideally at system level. For the more senior opportunities, you should also have had previous involvement in the implementation of a UNIX port or in the provision of low-level Graphics Library support for CAD tools such as PHIGS or GKS.

Ref AU/DL/014

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We offer sound career prospects, training to meet future needs, excellent salary packages and benefits which include assistance with relocation where appropriate.
To apply for any of these positions, please write with full career details to Mrs. Janet Henson-Webb our Senior Personnel Officer at Acorn Computers Limited, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Telephone: 0223 245200.

APPOINTMENTS

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range of software products available through PRES

A3000

A3K1 . . . a free standing monitor plinth that allows the A3000 to move back and forth beneath the monitor, helps prevent accidental contact with reset key and is upgradable to . . .
A3K2 . . . provides the scope for up to two further floppy drives (3.5/5.25) AND a hard disc drive housed with style above the A3000 — no boxes hanging on the end of ribbon cables.
ALSO A3K3 . . . a specially designed case to house Podule/expansion cards. This case locates and is bolted to the back of the A3000 to ensure a safe and sturdy expansion. The bonus is that it will be expandable to take up to a further 4 smaller podules. Current development includes . . . ADC/DAC, SCS1, battery-backed RAM, midi, etc.
Also a user port, 1 mHz bus, also disc drive expansion board, with more planned.

ADVANCED CONTROL PANEL (20)/M/B/E/C

£34.50

ACP is a front end control panel language providing a sophisticated yet friendly interface between user and computer for access to Languages. MOS functions and the users own file utility etc. Main features include pull down windows, simple to change MOS configure, floating point calculator, file manager, SW ROM's facilities. (16K EPROM & FULL MANUAL)

"It's very easy to create an entire customised front end for your own use." – *Acorn User, August 1987.*
"ACP is much better than any of the other front end systems I've seen." – *Acorn User, August 1987.*
"I can recommend it to anyone who wants easy access to the Electron's functions." – *Electron User, August 1987.*

ACPs main features are:-
★ Pull down windows operate throughout
★ Users can create their own windows

PRES Archimedes Utilities — New Product . . .

A low cost utility for Arc users containing . . . memory allocation map, screen mode table, file type listing, module interogator, continuous compaction and hard disc back-up.
Only £11 ex VAT, £12.65 inc.

ADVANCED ELECTRON DFS (05)/E

£24.15

Electron & Plus 3 users . . . gain BBC compatibility by adding the Advanced Electron DFS (1770 DFS) this is the same disc filing system supplied with the BBC B+. Now you can produce and access (compatible) BBC disc based software. We can also supply 5.25" disc drives to add to your Plus 3 (inc 2nd drive adapter).
"ACP has produced another superb ROM for the Electron" . . . Electron User Feb '86 (Supplied on 16K EPROM + DFS MANUAL)

Also DFS E00. An alternative to the DFS, designed for use in Sideways RAM (ABR). (14)/E + ABR (3.5" ADFS disc + manual) *£19.99*

ADVANCED ROM ADAPTER 2/M/E

£13.00 excl VAT: £14.95 inc VAT

An Acorn approved cartridge containing a card with special 'zero' profile sockets that allow you to fit compatible 8k or 16k EPROMS/ROMS. The cartridge is fully enclosed providing complete protection for your ROMS. Simple to use - No switching - complies fully to the Acorn (sideways) ROM filing system. "The best ROM cartridge is by far the ARA 2. . . *A&B Dec 86*

ADVANCED BATTERY-BACKED RAM M/E

A standard Acorn approved cartridge but containing 32k (2 x 16k) of sideways RAM. The added bonus is the battery-backed feature that holds the RAM contents when the power is switched off! Different ROM images can be loaded into either bank from ROM images previously saved. The banks can also be locked to imitate ROM use. Now it is possible to have View & ViewSheet in one cartridge every time you switch on. Other uses include &EOO ADFS, printer buffer, ROM software development. The use of ABR is simplified by the newly written PRES software utlities which include:- SaveROM, LoadROM, Lock, Unlock, Printer Buffer, Zero and MakeROM a new utility to put your own software from disc or tape into ABR and use the ROM filing system. All software is supplied in ABR with a simple menu to transfer the utilities to your own media. No hardware switching - totally software controlled. Instructions for using supplied software and necessary information for users developing their own applications.
"It's a superb add-on and a must for all serious Electron Users" . . .
Electron User

£39.00 excl VAT; £44.85 incl VAT

ADVANCED PLUS 7/M/E/B/C

£39.50 ex VAT; £45.42 inc VAT

An internal battery-backed RAM upgrade for the Advanced Plus 6. TWO 16K pages of Sideways RAM, battery-backed and featuring full write protect facility. Just like ABR but fitted internally & vacating a cartridge slot. This product is compatible with all Acorn BBC/Master & Electron computers.

ADVANCED BASIC EDITOR PLUS — NEW PRODUCT

An exciting new product based on Acorn's original Basic Editor. It contains all the original features plus many enhancements that make it one of the most powerful Basic Editors available supplied as:
32K ROM Module .... £24.95 ex VAT, £28.69 inc VAT
Cartridge version with spare ROM socket £32.00 ex VAT, £36.80 inc VAT

Colour Monitor

Phillips CM8833 14" Medium Res. (600 x 285) RGB, CVBS, SKART, and audio inputs. Complete with BBC/Electron RGB lead. Securicor delivery included.
£213 ex VAT, £244.95 inc.

ADVANCED DISC INVESTIGATOR

(06)/M/B/E/C £28.75

A very powerful Disc utility for standard & non-standard discs. Backup most protected discs, edit any type of non-standard disc, check & repair faulty tracks, create new disc formats, copy 40 track discs to 80 track discs, verify two non-standard discs.
("ADI features an extremely comprehensive sector editor, and one of the finest I've seen" . . .Tubelink on Prestel) (supplied on 16K EPROM + manual)

ADVANCED 1770 DFS

3 versions ADM/C(11) - ADB(12) ADE (13) £34.50

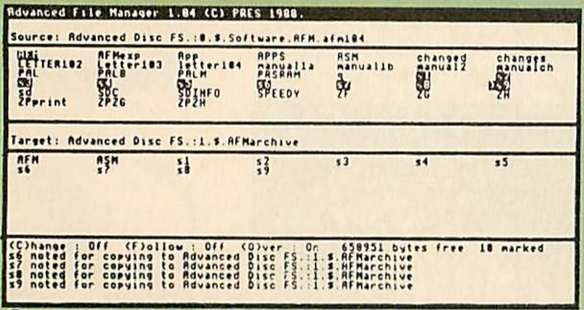
ACP have totally re-written the Acorn 1770 DFS, enhancing existing features & adding new ones. The result is a very fast and powerful disc filing system with the ability to operate in double density occupying both sides of a disc (640K). Automatic file relocation, improved file handling, 62 file catalogue and Sways RAM can be used as a fast RAM DISC. (16K EPROM + comprehensive manual)

PRINTER . . . Panasonic KX-P 1081 Graphic Epson Compatible NLQ ready to connect including capable, delivery and VAT £155.65 ex VAT £179.00 inc VAT (Spare Ribbon £5.50 ex VAT; £6.32 inc VAT)

DISC DRIVES	Ex VAT	+ VAT
Cumana 5.25 dbl/sided 40/80 track, switchable, inc psu	£113.00	£129.95
Cumana 5.25 single/sided 40 track, inc psu	£112.17	£129.00
Cumana 3.5 dbl/sided 80 track, inc psu	£112.17	£129.00
PRES pecial 3.5 dbl/sided 80 track, inc psu	please 'phone for details	

PRES – ADVANCED FILE MANAGER M/B/E/C

The ultimate 'front-end' for ADFS and DFS £25.00 ex VAT; £28.75 inc VAT



Screen picture shows AFM in Copy mode on Master Turbo

AFM follows the PRES 'Master Plan' of upwards compatibility – it runs on Electron, BBC B, B+, B+128, Master 128 and Compact, with Second/Co-processors and Acorn-compatibile versions of DFS & ADFS.

AFM has four distinct modes:

MENU – allows browsing through the files and directories on a disc. Files are started from a menu of up to 7 options chosen for a selected ROM. Loaders are provided for Basic, The Basic Editor, View, ViewSheet, ViewStore, ViewSpell, Edit, Wordwise (+) and InterWord. This list can be expanded infinitely using an Acorn-approved OSWORD call. . . full details and example in the manual..
DELETE – allows files to be marked and then deleted with one keystroke.
RENAME – allows one or more files to be marked and then renamed using a wildcarded name, ie one which varies with each file renamed. Thus you could rename s1, s2 and s3 to be s1_old, s2_old, and s3_old in one operation. . . and that's only the beginning! As well as using the whole of the original name you can also pick out individual characters to form part of the new name.
COPY – the strongest feature of AFM. It is a two stage copy routine. With both source and target directories shown on screen the files to be copied are marked. Once all the files have been marked copying is started and the computer can be left to get on with it!
Large files can be split across several disks, and recombined.
As much as possible of the computer's memory is used for copying files, including unused parts of shadow screen memory, sideways ram banks (inc. AP7), ram cartridges (inc. ABR (32K) and AQR (256K)), tube memory (up to 61K), B+ paged ram (12K) and unused parts of the Slogger Master Ramboard (Electron).
Comprehensive error trapping and recovery is provided, so a copying run will rarely have to be aborted unfinished! And there's much, much more.

NEW

THE ADVANCED PLUS 3 MK II

NEW

The only fully compatible disc upgrade running Acorn's own filing system. The MK II is now supplied with 3.5" DOUBLE SIDED disc drive providing a storage capacity of 640K. A.P.3 MK II gives you

1. A fully Acorn compatible 1770 interface (Cartridge)
2. 80 track 3.5" disc drive, double sided (640K)
3. Separate PSU
4. Acorn ADFS
5. Welcome disc
6. Utilities
7. Full documentation
8. All the advantages of the original Plus 3 PLUS extra ROM socket.

OUR TOP SELLING PRODUCT

NEW IMPROVED

Undoubtedly the most popular disc upgrade system for the Electron (Requires Plus 1)

Remember — 2nd drives (3.5 or 5.25) can be added and the AP3 drive can be used on a BBC or Master computer! Also most Electron disc-based software is supplied on 3.5" ADFS discs.

The only fully compatible disc upgrade running Acorn's own preferred filing system (supplied on: Plus 3, Master 128, Master Compact and now the Archimedes)

*** EXTRA BONUS ***

3 games on disc — SNAPPER — DRAUGHTS — REVERSI

COMPLETE PACKAGE ONLY

£129 excl VAT : £148.35 incl VAT

ADVANCED PLUS 1. . .The plus 1 is the main expansion for the Electron. It provides the Centronics parallel printer, printer port, joystick interface and 2 cartridge slots into which go ROM cartridges including View, Viewsheet, Pascal, Logo and our own popular AP4 disc upgrade.

£50.00 excl VAT; £57.50 inc VAT

ADVANCED PLUS 6. . .a fully buffered 6 ROM expansion module for the Electron user. AP6 is fitted inside the advanced Plus 1 or modified Acorn Plus 1 (when used with the Acorn Plus 3, 5 ROM sockets are available). All sockets are designed to accept either ROM/EPROMS or RAM chips. A further feature is the optional AP7 upgrade.

"A marvellous piece of design. . .don't hesitate buy it!" - *EU, May '88*

£33.00 excl VAT; £37.95 inc VAT

Upgrade service available for original Acorn Plus 1 please call for details

---

MUSIC 5000

The popular BBC music synthesizer available for Electron users. Required 1MHz buff (see AP5). Supplied as M5000 Synthesizer hardware, 16k ROM, disc utils, and full documentation.

£99 excl VAT; £113.85 inc VAT

Please state 3.5" ADFS/5.25" DFS

ADVANCED PLUS 5

A unique interface for those wanting the maximum expansion from just one slot in the PLUS 1 AP5 contains:- A User port for connecting peripherals such as a mouse. 1 MHz bus allowing Music 5000(e), prommers and various control devices to be added. Tube interface for connecting and Acorn 2nd processor or even a Master Turbo board (through a 'Co-Pto Adaptor') - & TWO spare ROM sockets (1 high priority). All hardware connections are Acorn compatible thereby allowing many BBC products to be added (remember that some software modification may be necessary for the Electron). So although some expansion options may appear expensive on an Electron you do have upward compatibility.

£55.00 Ex VAT; £66.70 inc VAT

Advanced Plus 2 ROM

We feel this is one of the best, low cost, additions we have produced for the Electron & +1 user, especially for Plus 3, AP3, ABR & AP7 users now with this easy to fit upgrade you can add:

1) Fix for Tape filling system in Hi-res screen modes. 2) * ROMS- displays ROM/ROM images present. 3) * UNPLUG disable ROM/RAM image. 4) * INSERT - enables or inserts a previously unplugged ROM. 5) * KILL - totally disables the Plus 1. 6) * LOCK - locks a sideways RAM bank in ABR, AQR, AP7 7) * LROMS - locks all sideways RAM banks found. 8) * UNLOCK - to unlock a sideways RAM bank in ABR, AQR, AP7 9) * UROMS - to unlock all sideways RAM banks found. 10) * SAVEROM - saves a ROM image to current filing system. 11) * LOADROM - loads a ROM image from current FS into a RAM bank. 12) * FORMAT - will format an ADFS disc for Plus 3 or AP3. 13) * VERIFY - tests every sector on an ADFS disc. 14) * VFORM - formats and verifies an ADFS disc in one command. 15) * BUILD - creates a text file that can be used by *EXEC (ie !BOOT). 16) * LIST - displays a numbered listing of a text file 17) * TYPE - displays a file on screen with no line numbers. 18) * DUMP - to view a file's contents on screen. 19) * LANG - selects a default language to be booted on {CTRL-BREAK} 20) * HELP - provides a full 'help' list on all the ROM's commands. 21) * AQRPAGE - selects specified page in AQR.

Now there is no need to search for your utilities disc every time you want to Format/Verify a disc, Build a !BOOT file or lock/unlock/Load a ROM image into ABR PLUS much more . . . . . the ideal companion from the company that produces the Acorn Plus 1.

£11.00 ex VAT; £12.65 inc VAT

The AP2 is the definitive Plus1 ROM. . . . .I'm not sure what i'd do without it. . . . .like all of PRES's other products, it's been well worth waiting for"

July '88

FILING SYSTEMS

ADFS VERSION 1.1

Suitable for existing Plus 3 or A.P.4 users. This new version has the software fixes for Zysyshelp, write protect disable & compaction. Also Winchester code has been replaced with the necessary driving software to handle AQR as a 256k RAM DISC. Please note - ADFS is Acorns adopted standard filing system supplied on the Plus 3, Master 128, Master Compact & now the Archimedes. Supplied on 16k ROM with Welcome disc & utilities. Please state 3.5/5.25 welcome disk.

£14.95 ex VAT; £17.19 inc VAT

(ADFS manual supplied separately)

ADFS EOO

For Electron users with either Plus 3 or A.P.4 and 32k of S/W RAM i.e. ABR. All the benefits of ADFS but without all the loss of RAM! Includes all the software 'fixes' call for managing the new & original ADFS. One of the most frequent question we are asked: "How do I get back the memory lost on my Plus 3 system?" Answer: PRES ADFS & EOO regains 3.75k leaving page @ &EOO the same as Tape!

ADFS EOO supplied; 3.5 ADFS (manual available separately)

£14.95 ex VAT; £17.95 inc VAT

5.25 ADFS (manual avail. sep.) **£14.00 ex VAT; £16.10 inc VAT**

5.25 DFS(2 discs + ADFS manual) **£19.00 ex VAT; £21.85 inc VAT**

(See Special Package Prices)

DISC INTERFACES (Plus One required)

AP3 INTERFACE: As supplied with AP3 package. A fully Acorn compatible disc interface that will accept any standard 5.25 or 3.5 80T drive with PSU. It runs Acorn's ADFS (as supplied on Acorn Plus Three, Master 128, Master Compact and now the Archimedes) supplied with A.D.F.S. manual and welcome disc + Utilities and 3 bonus games (please specify 3.5 or 5.25 80T format). Also provides a spare 16K rom socket. **Price £52.00 ex VAT £59.80 inc VAT**

AP4 INTERFACE: A fully Acorn compatible disc interface that will accept any standard 5.25 or 3.5 drive with PSU. It runs the 1770 DFS (as fitted in the BBC 'B' and Master) keeps pace at &EOO - has utilities in rom and provides a spare 16K rom socket (DFS manual included. **Price £60.83 ex VAT £69.95 inc VAT**

AP34 INTERFACE: Get the best of both filing systems. Now available from PRES the ultimate interface. Fitted with both Acorn approved filing systems. . .Acorn's current standard ADFS and Acorn 1770 DFS (which can be run at &EOO) ADFS and DFS manuals supplied + ADGFS welcome disc with utilities.

Price £69.55 ex VAT £79.98 inc VAT

SOFTWARE PRODUCTS

ADVENTURE GAMES 5 different adventure discs:- Ultimate Prize, Dreamtime, Priate's Peril, Taroda Scheme & Stranded.

All 3.25 ADFS — £6.95 ex VAT £7.99 inc VAT each disc

Advanced Games Compendiums - on disc with so many of our products providing more 'serious' add-ons for the Elk; we thought it was time to allow easy Access to some of the favourite games ON DISC! . . . Three volumes of popular games, previously only available on tape, now 'instantly' loadable from menu on disc. Titles such as Croaker, Felix & Fruit Monsters, Killer Gorilla, Danger UXB, Swoop, Ghouls, Invaders, Swag, Galactic Commander, Felix in the Factory, Bumble Bee, Gauntlet, Frenzy, Moonraider, Positron etc. etc.. Each volume contains EIGHT menu selectable games.

3 ½ ADFS £9.99 ex VAT £11.49 inc VAT

5 ¼ DFS. £8.99 ex VAT £10.34 inc VAT

View the Acornsoft word process for the Electron & +1 inc. full documentation — £14.94 inc VAT

ViewSheet The Acornsoft. . . . . spreadsheet for the Electron & +1 inc. full documentation — £14.95 inc VAT

View & ViewSheet special price . . . . — £22.00 inc VAT

SPECIAL PACKAGE PRICES

AP1 + AP3	£165.00 ex VAT	£189.75 inc VAT
AP1 + AP6	£77.00 ex VAT	£88.55 inc VAT
ABR + 3.5" ADFS E00	£48.65 ex VAT	£55.95 inc VAT
ABR + 5.25" ADFS E00	£46.95 ex VAT	£53.99 inc VAT
ABR + 5.25" DFS (ADFS E00)	£51.00 ex VAT	£58.65 inc VAT
AP5 + Music 5000	£152.17 ex VAT	£175.00 inc VAT
AP7 + 3.5" ADFS E00	£49.52 ex VAT	£56.95 inc VAT
AP7 + 5.25" ADFS E00	£48.65 ex VAT	£55.95 inc VAT
AP7 + 5.25" DFS (ADFS E00)	£52.13 ex VAT	£59.95 inc VAT
AP4 + CS400	£147.78 ex VAT	£169.95 inc VAT
AP1 + AP4 + CS400	£189.00 ex VAT	£217.35 inc VAT

********* ACCESSORIES *********

	ex VAT	inc VAT
Electron power switch This useful accessory provides a double-pole in-line switch with a new power jack-plug already attached; just connect to the existing lead, having removed the old jack-plug.	£3.96	£4.55
Plus 3 2nd drive adaptor converts the fitting at the back of the original drive which has been configured to Drive 1.	£6.91	£7.95
AP3 2nd drive lead replaces existing drive cable with one containing an extra connector for adding a second drive configured as Drive 1.	£5.96	£6.85
Electron Advanced Users Guide		£3.95
ADFS Guide Manual		£5.00
DISCS 3.5 10 in plastic library box		£19.95
5.25 twin gift pack		£1.49

M = Master B = BBC C = Compact E = Electron

Please note our NEW address:-
P.R.E.S. LTD.,
P.O. Box 319,
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Fax: 0276 51427

(Mail order only)

All our prices include UK delivery & VAT.

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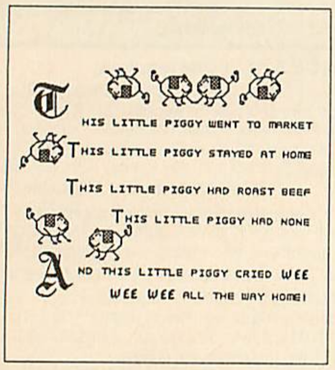
Tel: .... I enclose payment for £ ....

Credit Card No.: .... Exp date .... (Ref A122)

New

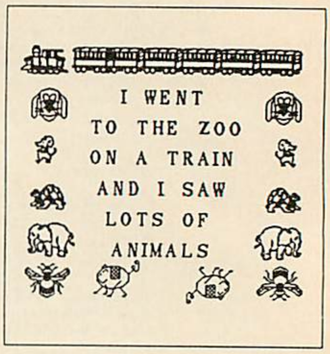
PRINTBOX





PenDown users asked us for fonts on the screen; flexible page layout, mixing text and graphics; and the ability to grab screens from other BBC programs to include in their documents. They also wanted it to be as easy to use as PenDown. With Printbox, Peter Hunter (the designer of PenDown) has delivered all this and more.

- Create full page designs, mixing graphics with text;
- What you see on the screen is what you get on the paper;
- Use the full range of PenDown fonts, Jumbo, Gothic, Horizon etc. There are 22 in all.
- Cutting and pasting, mirror writing and merged screens are all part of the Printbox magic.
- Printbox can be used to create posters, labels, letterheads, newletters, fly sheets and greeting cards, in full colour if you have a colour printer.
- Printbox comes with a full range of fonts and a library of clip art, all ready for incorporation in your designs.
- Use the powerful Resource Editor to create your own fonts and clip art.
- Grab screens (modes 1&4) from other BBC programs, and import them into your PrintBox documents. It couldn't be easier.
- Print two columns of text imported from ASCII or from PenDown files.
- Printbox stands alone, but makes a perfect complement to PenDown. If you have one, you want the other.





From the publishers of LOGO, PenDown and Numerator

LOGOTRON

Available for all BBC machines, priced £24.00 excl. P&P and VAT.

Further details available from: Logotron Ltd, Dales Brewery, Gwydir Street, Cambridge, CB1 2LJ. Telephone: (0223) 323656

Archimedes Shareware Discs

Shareware Nº 0 – 49 graphics demo programs plus "MenuMaster" – which allows you to add in your own demos and edit the order in which the programs are run.

Shareware Nº 1 – MenuMaster with 7 more graphics demo programs plus Life, Mandelbrots, European Geography, Structured Directory Lister.

Shareware Nº 2 – DFS reader, backup and archiver, 9 graphics demos, 256 colour Sprite Editor, CMOS ram Editor, Disc Copier, LQ printer Font Definer, Matrix Functions, Memory Mappings & Vector Listings, BASIC Fast Screenload, Connect Four, Mastermind, Solitaire and Star Trek. (Cost £4.50)

Shareware Nº 3 – Epson printer setup, Underground map update, CMOS editor update, System Delta to FWPlus mailshot, Audio tape inlay printer / database, Videotape database, File transfer with a Liberator, Monitor test pattern generator, Contours Demo, Graphics Demo, VTR count-down clock, "ARC" file compressor, Flip Game, Night Shooter, Let Drop.

Shareware Nº 4 – BBC font character editor, Bird watcher's database, 3D Mandelbrots (BASIC), Graphical shape transformations, 8 "pretty patterns" programs, Hidden line graph plotting, FWPlus printer driver editor, File transfer and sorting utility, Patience, Golf.

Shareware Disc Nº 5 – 51 pieces of music, some classical, some modern, for the Music Editor.

Shareware Nº 6 – Contains various utilities and printer drivers for First Word Plus

Shareware Nº 7 – A disc database of Archive magazine plus data files for Archive, Risc User and Beebug for use with the ArcScan Database available from Beebug.

Shareware Nº8 – "YAIG" – Yet Another Invaders Game with excellent sprites and animation (Needs 1 Mbyte.)

Shareware Nº9 contains various graphics demos and examples of computer graphics, several file utilities (EXALL, disc tree printer, filetypes and 'filedo' utilities and a disc recoverer), mode 15 to mode 12 converter, palette converter (Arthur to RISC-OS), NEC printer utilities, two fast fade programs, System Delta Plus export utility, ADFS disassembler (Arthur only), bank account manager and three games: 3D breakout, bowls and roller ball.

Shareware Nº10 contains Address book database, 4096 colour selector, expenses manage, Reversi game, Star Trek, a simple 3D volume of rotation program and 29 astronomical programs.

Shareware Nº11 – 6 concerti in Maestro form – Beethoven, Chopin, Grieg, Liszt, Mozart and Schumann.

Discs £3.50 each (except Nº2: £4.50) – Buy four discs and get one free

Special price for Archive Magazine subscribers – all discs (including Nº2) are only £3.00 each

For more details, contact either **Adrian** or **Alison** on 0603–507057. Send cheques, payable to **Norwich Computer Services, 18 Mile End Road, Norwich, NR4 7QY.**

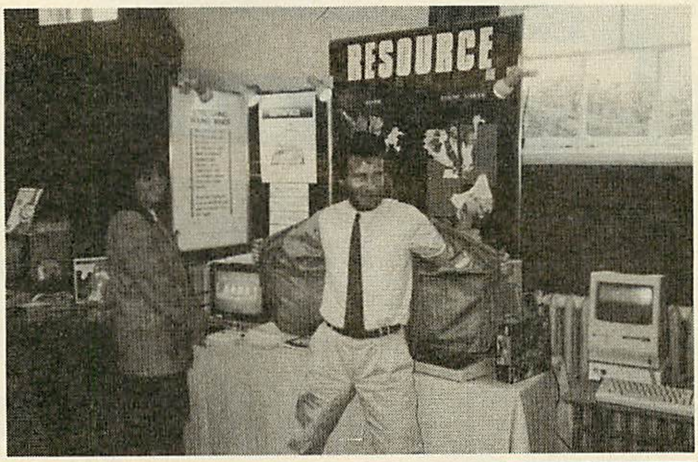
Pulling the plug

The recent release of the national curriculum Design and Technology proposals has put the computing fraternity into a spin. *The Times Educational Supplement* led with an article proclaiming the end of computing in the primary school while the *Daily Mail* proclaimed this meant pupils would be taking Business Studies instead.

Fortunately the conclusions are much more balanced, especially it you actually bother to read the report. However, the accusation that pressure has been taken off the primaries because of funding difficulties seems to be true.

Original specifications for computer use in the curriculum were broader. Sources close to the DES were talking of 'massive investment' needed to fund the implementation of the reports across the curriculum. The government has once again pulled the plug on education because of financial constraints.

Do we want a technologically prepared future or are we just playing with the figures to keep the books balanced for the next election?



Bill Bonham of Sherston Software shows Resource marketing assistant, Anna Limbrey that every awful jacket has a golden lining. Both companies were present along with thirteen others at an exhibition staged for his region by Roddy Stuart, adviser for Glasgow.

EDUCATIONAL SEMINAR

At a recent seminar, held for the benefit of advisory teachers at (of all places) Heathrow airport, Acorn showed off its new baby, the A3000.

Although there was a wide range of products for secondary schools, the primary sector staff found less to fulfil their needs. A misunderstanding of what comprises Archimedes software also seems to be causing some confusion.

There is the impression that titles 'ported' to the Arc as a stop-gap are in fact part of the Arc suite that is available. Undoubtedly these packages run on the Arc and the A3000 most effectively but who wants 8-bit software on a 32-bit computer?

Acorn is at present taking steps to ensure that the difference between the two standards is made clear – not least to its sales staff.

At the same seminar Acorn announced a new free scheme entitled the 'Acorn Schools Service'. Registration by a school entitles it to a regular newsletter, a directory of software which is regularly updated, the *Micronews* video, access to restricted telephone hotlines for technological enquiries about both hardware and software and three months access to SID.

ITTE REPORT

Further to my snipe at initial teacher training last month, it is now revealed the implications of the Design and Technology report will mean an increase of funding of up to 1000 per cent for some teacher training institutions.

The Trotter Report which surveyed ITTE establishments' expertise and equipment of IT training revealed the trend is nationwide to a greater or lesser extent. Colleges and polytechnics are still working on original equipment funded by the DTI schemes of 1982/3. No DTI software or hardware schemes have been approved for ITTE since then.

It seems incredible that the government expects teacher trainees to cope with the IT requirements of the national curriculum and yet it fails to produce the equivalent goodies that the schools get.

Nor it seems do the institutions get much sympathy from the hardware or software companies themselves.

The exception perhaps is one computer manufacturer whose fruity logo will be much in evidence at the ITTE conference this year where it will supply computers, software and staff towards producing the conference proceedings booklet.

Are you listening, Acorn?

Nick Evans

Other interesting features discovered at Acorn's A3000 seminar included:

- Apparently the A3000 has 1.5Mb of spare Rom space waiting for someone to fill it with a good idea. What features do you want on the A3000? Acorn is anxiously awaiting your calls.
- The A3000 has holes in its base so that it can be screwed to a desktop. There are some disadvantages in making computers smaller you see!
- The user port has not really been left off the A3000 – it just needs 40 odd pounds per machine to get Acorn to stick it back in again.
- Teachers are now able to buy the A3000 interest-free over two years from Acorn. This amounts to approximately £30 per month.
- The A305 has been discontinued (some wonder why it was created in the first place).
- The Compact will leave the stage in January 1990 – except for users in Australia who, for some reason, seem to buy it in droves.
- The Master will never ever ever stop production. Never. Good Friday next year will be on a Thursday.
- The A310 will continue in production while there are people foolish enough to buy it. (Yes, I did.)

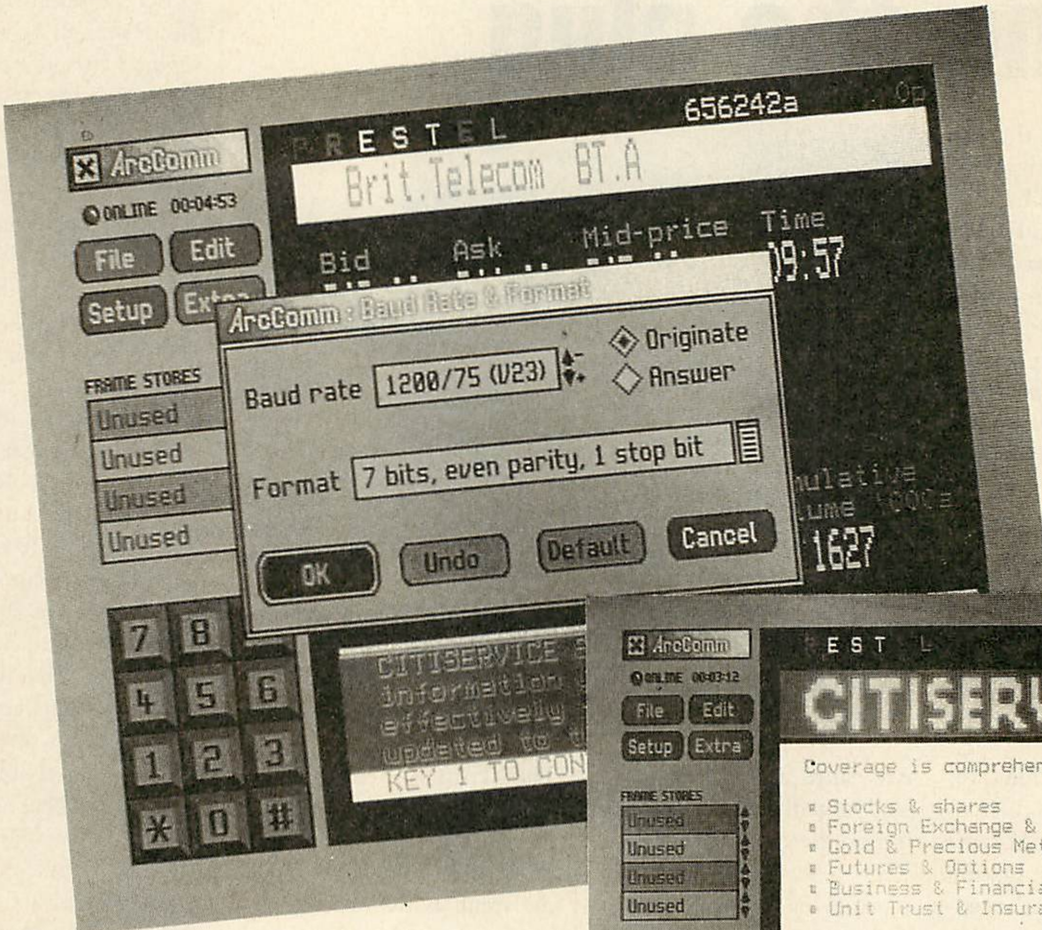
LATEST LIST

The latest version of the *Datafile of Educational Software and Addresses of Interest to Computer Users in Education* is now available. The software list now extends to 4370 entries and there are 1000 addresses to complement the list. The price is £2 from Nick Evans, PO Box 55, Grimsby DN32 0QB (0472) 77215 E-mail 83:JNL500.

If you have any education news or interesting stories, send them to Nick Evans at BBC Acorn User.

OFFERS

ARCCOMM





Taking full advantage of the Risc OS, *ArcComm* is a unique new communications package for the Archimedes.

ArcComm's comprehensive design boasts access to all three European viewdata standards, (Prestel, Teletel and Bildschirmtext), together with ANSI colour, VT52 and VT102 scrolling terminals. Both Prestel and Bildschirmtext support Vasscom error correction, and the VT102 terminal offers 132 columns, and smooth scrolling. Full coverage of international character sets is included.

The package has been produced with ease of use as a priority. All screen displays are clear and uncluttered, with pop-up menus and dialogue boxes making control as simple as possible.

You won't have to remember strings of numbers! Its telephone number list allows you to dial and log-on automatically. You can store viewdata frames while on line, edit and upload mailboxes, and load/save frames or screens onto disc.

While communicating, it makes use of the full screen, rather than running in a desktop window. But you can return to the desktop at any time, and *ArcComm* remains running as an icon on the icon bar. You can use other desktop software while *ArcComm* stays on-line but inactive. And clicking on the icon brings back full-screen communication.

You can automate the log-on sequence for any comms service, by using *ArcComm*'s own procedure language. This allows you to log-on, set up the correct terminal emulation and all your preferences through a single menu selection.

ArcComm supports Hayes, DTI and manual modems, with details of how to write drivers for other modems in the User Guide provided. You will need Risc OS to use the package, and 1 Mbyte or more of memory. The package costs £29.95.

Communicate with Risc OS!

Please send me ________ copies of *ArcComm* at £29.95

I enclose my cheque/postal order for £________
made payable to **BBC Enterprises Ltd**
Orders must be accommpanied by cheque/PO

NAME ________

ADDRESS ________

____

________ POSTCODE ________

SIGNED________ DATE________

Send this coupon with your cheque to **ArcComm Offer, BBC Acorn User, Redwood Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ.**

Battle of the giants

The dual announcements of a new data network, and Microlinks' departure from Telecom Gold is big news.

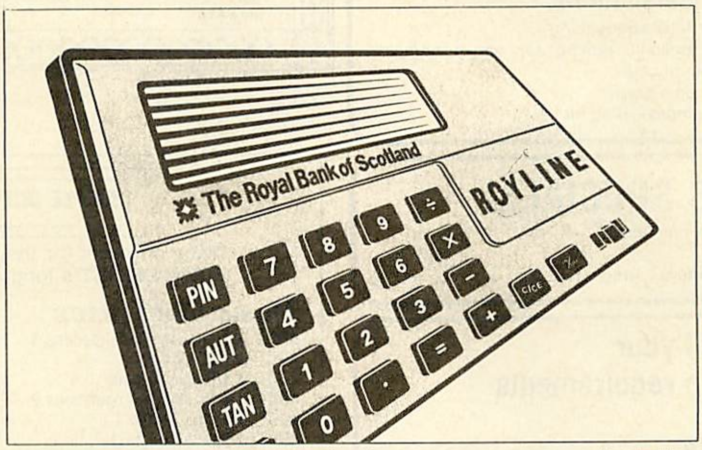
Dialcom which operates Telecom Gold (as well as Prestel) must be none too pleased at the prospect of losing 14,000 subscribers.

Derek Meakin, MD of Database publications and the man who started Microlink in 1985 will no doubt make every effort to ensure that the transition from Telecom Gold on October 1 is a smooth one for his customers. However, I understand that Dialcom intend to entice Microlink subscribers to stay on Telecom Gold – probably by offering them a reduced subscription and bunching them together with the Telemap group on system 74. (Dialcom has a 40 percent stake in Telemap).

Meakin has also stated that moving to the new network will not incur a price rise for using Microlink. So, should Microlink subscribers move or stay on Gold?

My advice would be to move with Meakin, and here's why: For anyone wishing to access Telecom Gold outside the London area an a, b or b1 rate call is necessary. The other method is via BT's PSS (Packet Switched Stream) network. This incurs charges.

The new network uses the Istel access points. Currently there are 79 around the UK, five of which are in London. This means that 90 percent of the population will be able to connect to the new network with a local call. Further, Istel and Bell Canada (who operate the network) foot the bill for use of the data network, unlike PSS which bills the individual.



On-line viewdata based banking for the average man owes a lot to the Beeb. The reason? The Beeb is an excellent viewdata terminal and the PC is not. What a pity that the Royal Bank of Scotland's on-line financial management system will only run on a PC. Never mind, you can still use the majority of services with your trusty Royline security device (a dual tone to you and I).

Access speeds – Telecom Gold customers have long waited for access ports that could operate at 2400/2400 baud and offer error correction. The Istel/Bell Canada network will provide access ports with speeds ranging from 300/300 baud right through to 9,600 baud upon request – with error correction!

RIGHT OF REPLY

A small error crept into the July Comms Column in the story on the IPSS increase. The *BAU* House abacus slipped a bead or two and printed the total £115.50 which should have read £1.15. Chris Broomfield, Data Services Product Manager for IPSS pointed out the mistake.

In my example, I quoted an average segment length of 40 characters which is about right when you configure IPSS with the A2, D2 profile. However, Chris pointed out that a maximum of 60 characters per segment is possible if you configure IPSS with a transparent profile such as SP.

Thus, using my example of a file transfer at 1200/1200 baud, using Xmodem with a (generous) data-transfer rate of 110 characters per second totals 110 segments per minute – or £0.77 per minute – still far more expensive than dialling direct. Mr Broomfield also pointed out that on average a data transfer rate of 10 - 50 segments per minute is more typical. With a segment length of 60 characters that's a measly 600 - 3000 characters per minute with a 1200/1200 baud link.

One explanation for the low throughput is that a large number of banks and other financial institutions use IPSS for transaction processing. This involves keeping the data line open for the most part of the day and only passing data when a transaction (such as a credit card validation) needs to be processed.

Fine for banks and such like but for those who wish to use their modems for file transfer, or text retrieval then IPSS is not financially viable – and that's definite.

■ An enhanced version of Sid, Acorn's support Information Database is now on-line.

Written in Basic V and Arm code the new software runs under Risc OS on Arcs based at Acorn's Customer Services offices in Cambridge.

There is 5Mb of free software and technical documentation to download using Cet, Cet+ or Kermit protocols. The system is accessed via the Fastrak network at 8p per minute (ex VAT). More information from Acorn on (0223) 245200.

■ The Hi-Tec EC2400 quad speed modem which I've raved about in this column is currently going through the BABT approvals procedure.

When approved the modem will be sold as the Dataphone Pro-4 at £399 plus VAT, and the (unapproved) Hi-Tec EC2400 which is currently selling at £279 inclusive of VAT will be phased out.

Owners of the EC2400 will be interested to know that a new version of the modem software (V3.01) has been released, and that Hi-Tec may incorporate a Hayes help menu within the software. Hi-Tec is on (0733) 52440.

■ *Cop Shop*, a free crime prevention and self protection pack from West Mercia Police is available as telesoftware on Dudley College of Technology database.

Also available on the database is an on-line directory of all Open College courses. Information provided includes course codes and prices, together with a brief description. Call the DCT database on (0384) 239944 using Prestel compatible software.

If you have any comms news please send it to David Janda at BBC Acorn User or contact him on Telecom Gold 81:RED001 or via Prestel 942876210.

All in a word



As interest in the Hybrid Music System continues to increase you will find a growing number of sources of type-in listings.

These are fairly easy to enter (once you know how) but they can cause a few problems for newcomers.

An Ample listing is simply a list of word definitions used by the program. You cannot enter words into the computer in any old order. Every word can only contain other refined Ample words.

If you try to define a word containing a word which hasn't yet been defined (got that?) the system reports an error – '! Mistake'.

At the beginning of every listing you should find a complete list of words used in the program.

The definition of a word is enclosed between square brackets and the words at the beginning of a listing will be defined as empty.

This is similar to a null string definition in Basic, but even if a word is empty it is still recognised by the system and can be entered as part of another word without causing an error.

The first step in entering a listing, then, is to define all the words in the word list as empty. You can easily do this in Notepad.

In command mode, that is on the line below the Notepad screen at the % prompt, simply type in a double quote ("), the name of the word, then press f2 ("NAME) followed by f3 (MAKE). Then enter the correct definitions of the words which follow.

When words are defined in Notepad, the brackets shown in the listings are not actually required. These are entered for you automatically when you make the word.

You can define words outside of Notepad (as Music 500 owners will know) in command mode by simply enclosing the definition in brackets.

For example, enter the following word in command mode and when you come to the end of a line, press Return:

```
"riff" [%This is a comment
CDEFGABC
%That was a scale
]
```

If you now go to Notepad and enter:

```
"riff" GET
```

You will see the definition appear just as you entered it. You can, therefore, enter words either in Notepad or in command mode.

Beware, however, of creating single lines greater than 40 characters in length in command mode as you'll lose the end of them if you GET them into Notepad.

If you have examined the music on some of the Ample albums you may have noticed that some word definitions are too long to fit into Notepad. A full mix definition, for example, may be 18 lines in length.

You can enter long words in command mode. Rather than use the screen area underneath Notepad, type:

```
7 MODE
```

and you will have the full screen to play with.

This can be particularly useful especially if you make a mistake as the definition will probably still be on the screen and you can use the copy and cursor keys to copy parts of it.

TYPE AND WRITE

To see which user words the system contains, type SHOW. If you want to see the definition of a single word, use TYPE:

```
"part1" TYPE
```

WRITE is used to list all the user words in the program. Used alone it will scroll them up the screen, but you can also use it to dump the listing to a printer or to create an Ascii file on disc.

To send an Ample program to a printer, type WRITE, press CTRL-B, and press RETURN. When the listing is finished press CTRL-C.

To create a file on disc use the *SPOOL command:

```
*SPOOL program
WRITE
*SPOOL
```

*SPOOL creates an Ascii file which you will be able to load into a wordprocessor (for editing) and back into the Ample environment:

```
*EXEC program
```

You can use the *SPOOL function to create files of useful words. Instead of using WRITE, however, use TYPE:

```
*SPOOL usefulword
"usefulword" TYPE
*SPOOL
```

These can be *EXEC ed into a program at any stage during its development without disturbing the rest of the program.

If you have tried dumping a listing to a printer, as described above you may find the layout a little raggy, especially the list of empty words. You can tidy it up in a wordprocessor but when saving it out again remember to save it in Ascii format in order to *EXEC it into Ample.

You could, of course, enter a complete program in a wordprocessor, but it's not generally advisable as there is no error checking.

Purely as an exercise in typing in listings, you under stand, this month's yellow pages feature a short program which layers rythmic and melodic phrases of different lengths over one another.

You can enter all the parts in Notepad if you wish, except 'mix' which is too long. This must be entered in command mode as described above, although you could create your own mix in the Mixing Desk.

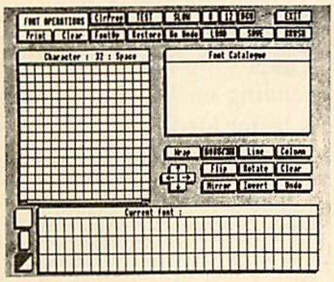
In fact, the piece is constructed from eight short individual phrases so use the Mixing Desk to create your own arrangement.

If you have any musical tips you'd like to share, or if there are any topics you'd like to see covered in this column, please write to The Music Column, BBC Acorn User, Redwood Publishing, 20-26 Brunswick Place, London, N1 6DJ.

LETTERS

BBC Acorn User, 20-26 Brunswick Place, London N1 6DJ. BTG/TTNS 81:RED001

WAPPING ERRORS



Thank you for the review of *Wapping Editor* in the July issue. However, I would like to point out that the review was incomplete as several major features of the package were omitted by Bruce Smith.

Nazir Jessa
Watford Electronics

The review did indeed fail to mention several features which go to make *Wapping Editor* so powerful. First and foremost is the Font Editor. This allows the user to create font designs in a range of sizes, pixel by pixel on a grid. The designer includes numerous functions such as flip, rotate, stretch, squash, character copy and superimposition.

The review didn't mention all the page sizes available. Eight page sizes are catered for and special custom page sizes can be created to your own specifications.

The review also makes no mention of the *Wapping Editor* support Rom. This provides a variety of utilities to help using *Wapping Editor* – a 'turbo' DFS to bring the DFS up to the speed of ADFS, extra graphics commands, extra star commands and a sideways Ram driver for other makes of SWR.

These omitted features confirm the reviewer's opinion of *Wapping Editor* as a most powerful DTP package for the Beeb.

SEEING THE LIGHT

I feel I must respond to the Scan-Light review in the July issue, since there are several inaccuracies.

The software was written to run under Arthur and only adapted for Risc OS. Now that Risc OS is becoming more widespread we can produce a Risc OS only version, and we are doing so. This will be made available to all Scan-Light owners. In any case the software is completely compatible with Risc OS and the desktop.

The comments on problems with interrupts are totally inaccurate. There is not, and never has been, a problem with interrupts.

Lastly, the price. The product will seem expensive to those with the 'Beeb pricing mentality'. The Arc is a different machine and quality costs money. No A4 width scanner can be brought for less. The same model for the PC costs £150 more. So, Scan-Light is excellent value for money.

Charles Moir
Computer Concepts

NOT SO PERFECT

With respect to your recent comparison of AVP's *Pixel Perfect* with *Wapping Editor*, we would like to point out a number of inaccuracies.

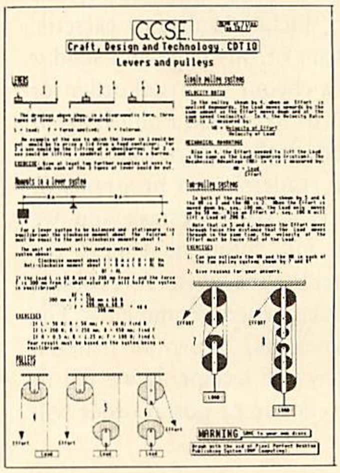
Pixel Perfect does not need a double sided disc drive. It is supplied on 40 or 80 track, single or double sided discs in any format. An Econet version is also available and backup copies for £7 alleviate the problem of the disc protection.

Your comments that font heights and widths are each twice the size of the last is ridiculous – that would end up with huge fonts. The font sizes step up in 25 increments.

You also say that the page size cannot be altered. *Pixel Perfect* can cope with up to 120 characters across an A4 page and sections of this space can be used for smaller page sizes.

As you say, it is the final printout which counts and the example enclosed shows what the program is capable of.

Simon Fea
AVP



GROUPING TOGETHER

I have recently set up a programming group for students. I am sure this will be of interest to BBC programmers.

The group is called the Elixia Software Foundation (BBC) and is part of the whole Elixia Software Foundation handling MS-Dos machines.

The group has three aims:

- To create an open forum through which members can communicate
- To give advice
- To publish members programs through our shareware catalogue.

Paul Vincent
Elixia Software Foundation

Any student readers wanting to contact Paul can do so by writing to: Paul Vincent, 'Fairwinds' Main Road, East Boldre, Brockenhurst, SO42 7WL

CALL FOR COMMANDS

I was pleased to see Dave Acton's remarks in *Arc Agora* in the July issue about the dreaded @% variable.

Other basics offer the much superior PRINT USING and ROUND so why can't Acorn do the same?

To, say, format a table of results with eight columns with different numbers of decimal places in each column and separators between columns, the variable has to be changed eight times in each line whereas PRINT USING describes the whole table in one easy operation.

M W Peters
Spetisbury, Dorset

CHANGING TIMES

No sooner has your new editor taken up residence, than kilobytes start appearing with a capital K. Are disks soon to be seen in *BAU* too?

Mark Thompson
Barnet, London

Discs with a C are too entrenched in the history of Acorn and the BBC to alter now.

QUESTIONS AND ANSWERS

If you have a problem with an Acorn micro, commercial software or a program you are trying to write then *BBC Acorn User* can help. The Post A Problem service guarantees to give you a personal answer within 10 working days for just £4.

Write out your problem with as much detail as possible and, if a program is involved, include a disc or cassette. Fill in the coupon at the bottom of this page and send it and your problem along with a cheque or postal order for £4 (including VAT) made out to Redwood Publishing. If you want recorded delivery add on the cost of this.

Please note that debugging readers' own programs or those from other magazines is a complex task and we cannot guarantee to give a full solution. Unless the problem can be spotted quickly, the Post A Problem service will only be able to make general comments. The service will answer the problem and return all material received within 10 working days of receipt. If we fail to match this promise then your cheque or postal order will be returned – you can't lose!

BBC ACORN USER READER SERVICE
20-26 Brunswick Place, London N1 6DJ.

NAME ____________________

ADDRESS ____________________

____

____

POSTCODE ____________________

DAYTIME PHONE NUMBER ____________________

I enclose a cheque/postal order for £4 made out to Redwood Publishing and an sae with my problem.

OFFICE USE ONLY Date in:

Date out:

Answered by:

Q Last football season I used a spreadsheet to maintain a list of match results in a league table.

Unfortunately my spreadsheet (*Viewsheet*) does not have a sort routine so that I could not 'automatically' keep the teams in the correct order based on the points they had obtained.

Can you recommend a spreadsheet with a sort function for my BBC Master 128?

A ***View Professional*, the wordprocessor and spreadsheet combination, contains a numeric and alphabetical sort function. This will do all that you ask with no trouble at all.**

Q I have a BBC micro model B and have used tape for some years. Now I want to change to disc. How can I get hold of the DFS now Acorn no longer sells it?

A **Watford Electronics still supply the Watford DFS for the BBC micro. This is the only DFS now available.**

Q I've been experiencing 'sticky keys' with my old BBC micro. I have heard from a colleague that I ought be very careful about using a solvent switch cleaner on my keys as the solvent can attack the plastic parts. Is this true and what do you recommend?

A **Some brands of solvent will attack the plastic found on some kinds of key switches. It is best to test solvents on sample material before you use them. I suggest you obtain a degreaser like IPA (iso-propyl alcohol).**

Q As part of a program I am writing, I need to determine which BBC micro the program is running in. I believe there is a negative INKEY function that will report this but I cannot find any reference to it in various user guides or other BBC books I have. Can you help?

A **INKEY(-256) returns a different value depending on which system it is being used.**

A BBC model B with a 1.2 OS will return −1. A BBC Master 128 will return 253 or 244 depending on its OS, and a Master compact gives 245.

Q I have an Opus Challenger, is there any way I can convert it to use the Acorn ADFS using the Challenger's disc interface?

A **Unfortunately not. The Acorn ADFS is designed to use the 1770 disc drive controller chip through the disc drive port. The Opus Challenger uses the 1MHz bus.**

Q As part of a course I am studying we have been doing some work on biorhythms. Do you know of any programs published or any listings available.

A **Many of the programs published three or four years ago concerned with biorhythms are no longer available. However, we have tracked down a listing in John Gordon's *100 Programs for the BBC Micro-computer* published by Prentice Hall.**

Q I want to use some of my 8-bit Beeb software with my new Archimedes. I have already attached a 5.25in disc drive via an external drive connector but the Archimedes will not read my DFS discs. What should I do?

A Your Archimedes normally reads files and programs on both its 3.5in and 5.25in drives only in ADFS format. It cannot read the 5.25in discs in DFS format.

You will need to purchase Beebug's *DFS Reader for the Archimedes* which costs about £8. With this you can transfer files easily from DFS discs to an Archimedes ADFS disc.

When you run the programs don't forget to have your machine running under one of the two BBC emulators present on the Welcome disc.

Q I have recently purchased a Panasonic 24-pin printer and I am looking for a printer dump that will provide me high quality dumps of mode 0 and mode 1 screens.

A There are few printer dump routines for 24-pin printers but there have been a number in the last year of *BBC Acorn User*. The April 1988 issue of *Acorn User* included both a mode 0 and a mode 1 dump written for the Epson LQ-800. It would not be too difficult to substitute one of these for the dump routine in your program.

BBC Acorn User is considering publishing a 24-pin version of the *UserDump* Rom. This would enable your program to call the dump routine with a single command. This should be the easiest thing for you as far as conversions are concerned.

In the meantime the easiest way to make progress is for you to purchase a copy of *Snatch* from 4mation. This is supplied as a sideways Ram image and will immediately dump or save to disc any screen when you press two keys. Unlike anything else available it has a 24-pin routine built in. The results are excellent.

Q I want to fit a real time clock to my BBC model B. Is there one available?

A There are a number of suppliers of real time clocks for the BBC model B. The one from Permanent Memory Systems of 38 Mount Cameron Drive, East Kilbride, G74 2ES should meet your needs. It was built by PMS to enable its wonderful Genie package to tell the time on the model B.

Q I've been trying to get an image of the Master version of *Edit* Rom to work on my Archimedes under the 65Arthur Emulator. Everything seems alright except the on-screen help display.

A You will need to issue the command: before running it.

Q I am looking for a high precision dump for producing diagrams held as mode 0 screens. Can you recommend one?

A Design Dynamics of 18 Meadow Way, Amphill, Bedford MK45 2QX has a package called *Mode-00 Dump* costing £12.95. This produces a very high resolution dump. It does not work like traditional screen dumps but instead takes a spooled screen file and creates a higher resolution image than the original – much like the Postscript dump program in this issue.

ACORN CUSTOMER HOTLINE

With the release of Risc OS comes a new 6502 emulator called 65Host. This application supports direct screen accesses, paged sideways Roms and direct accesses to some hardware.

The Customer Support department would like your help in compiling lists of software that work under this emulator, the 65Authur Tube and PC emulators.

If you know of any packages which run under these emulators, please write in, stating which version of the package you have used, what problems you have encountered, which emulator (and version of emulator) and which computer you use.

■ In the Master Compact there is a chip called the Eeprom. This does almost the same job as the Cmos Ram and battery backup in the Master 128 and holds the configuration settings used in the Master Compact. The chip has a limited life of about 10,000 writes to it before it needs replacing. This may seem like a lot but a number of software packages use the Eeprom to store values when they are running.

If you begin to have problems with the configuration after using the Master Compact for the period of 1 to 2 years this may well be the cause cause of the problem.

New Eeproms are available for a small cost from your local Acorn Dealer. This should be regarded in much the same way as replacing the battery in other Acorn Computers.

■ It is possible to create your own boost sequence when starting up Risc OS. This will allow you to load in whichever applications you like when you first start the Desktop. For example:

Create a text file using !Edit and type in:

```
  Filer_OpenDir adfs::Di
sc.$
  Run adfs::Disc.app1.!S
ystem.!Boot
  Run adfs::Disc.app1.!D
raw.!Boot
  Run adfs::Disc.app1.!E
dit
  Run adfs::Disc.app2.!A
larm
  Run adfs::Disc.app2.!T
inyDirs adfs::Disc.app2.
!Magnifier
```

(The name Disc is assumed to be the name of your hard disc). Save this as DeskTasks in the root directory.

Now add the following line to your !Boot file:

```
  *Desktop -file adfs:
:Disc.DeskTasks
```

Now CRTL-RESET your machine. Your boot sequence will execute, there will be a short pause and you will enter the desktop with your Disc's root directory open, with !Edit, !Alarm and !TinyDirs running, and !Magnifier loaded into !TinyDirs.

What has happended is that the *Desktop command has run each line of the DeskTasks file as a task within the window world. !System !Boot must be run before !Edit is run.

This is equivalent to !System being 'seen' in a Filer directory viewer and tells !Edit (and anyone else) where system resources can be found.

Note that all applications are quoted with their full path-name, including filing system name and drive name or number. So access to them is unaffected by changes of current directory, drive, or filing name.

Peter Dunn can be contacted at Acorn Customer Support department, Acorn Computer, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN or by leaving a message on the SID database.

HINTS & TIPS

COMPRESSED SPOOLING

Using double height and double width characters, printing function key strips and creating new screen modes

David Atherton

A more programming oriented column this month starts off with a contribution from David Flannagan of Hyde, who has sent a useful programmer's utility, which employs an extremely original concept – a rare thing these days.

Before I explain the program, let us look at the whole topic of Basic program storage and merging.

As you may know, Basic programs are stored in memory in a coded or tokenised form. The line numbers are stored as actual binary numbers (as opposed to their Ascii string representation), the Basic keywords are stored (by and large) as single bytes (outside the Ascii range) and only the remainder of the program is stored as plain Ascii text.

This is done for two reasons – to save space and to reduce the amount of time the interpreter takes to know what commands are being used and where they are, thus reducing the execution time of the program.

A Basic program can be stored as plain Ascii text (with the line numbers and keywords stored in their LIST form) by *SPOOLing it and it can then be reloaded as an executable program with the *EXEC command. Master 128 owners are also able to load and save from within the system editor.

One of the most useful reasons for storing a Basic program as Ascii text is so that it can be merged in with another program by use of the *EXEC command. When a program is already in memory, another program can be added – provided that the line numbers don't clash – if the second program is stored as Ascii on disc simply by typing *EXEC. There is another method which involves *LOADing a tokenised program at TOP-2, but this way offers no control over line numbers. Producing an Ascii listing via *SPOOL has a few disadvantages. A LIST command appears at the beginning, and a *SPOOL command at the end, a linefeed follows each carriage return, spaces appear before each line number and Basic tokens are stored in their full textual form.

The program that David has sent us creates a compressed spool file with all these disadvantages removed.

Note the point about Basic tokens. You can type a token byte directly into Basic. For example, in mode 7, if you type VDU 241 a 'q' will appear. This is Ascii value 241 (not the same as normal lower-case q).

Then copy the 'q' to the command line using the COPY key and follow it with '2+2'. Press RETURN and the answer 4 will appear. This is because you have entered the PRINT command directly as a token – its token value is 241.

David's program exploits this feature to reduce the space taken by keywords.

To use the program, type in the yellow pages listing, save and run the program. This will create a machine code file called Ascii. To generate the compressed file, simply load the program or program segment you require in the normal way and type *ASCII <filename>, where <filename> is the name of the spooled file you wish to create. The new file can then be loaded back in with *EXEC <filename> (or simply *<filename> on a Master) as a new or appended listing.

The only disadvantage of this system is that because of the tokenising, it is not possible to make sense of these files in a wordprocessor.

The program works by opening a file, then starting at PAGE, it scans through the Basic program. If a line does not begin with a line number it is ignored. This gets rid of the LIST and *SPOOL commands.

The line number is converted to Ascii and output, then the rest of the line is output exactly as stored internally. When an &FF is found instead of a line number, the file is closed.

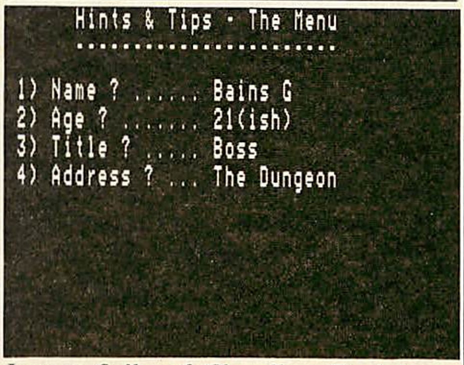
Another idea from David is strictly in the experimental area, and concerns the creation of new screen modes.

David has created two new screen modes – a four colour mode with resolution of 640x512, and an eight colour mode with 320x512 pixels.

The yellow pages listing allows you to select each mode. However, the system only works with some monitors – others just manage to scramble the picture completely. The routine works by doubling the speed at which data is sent to the 6845 runs and depends not only on the monitor but the characteristics of the other chips in your particular machine. Because it programs the 6845, the routine will not, of course, work on the Electron.

£5

DOUBLE HEIGHT INPUT



Jeremy Solly of Chandlers Ford has a short routine for novice programmers this month, concerning input of text using double height characters in teletext. It is a few years since this topic was covered and it is well worth repeating.

If you are writing a program in mode 7, you may want to use the very legible double height text, by printing the text line twice, preceding the text each time with a character 141.

Of course the ordinary INPUT statement will not let you do this. You can set up a double height line but the INPUT prompt

and any characters typed in only appear on the top half of the line, in single height.

Jeremy's function, which can be added to any program, allows double height text to be entered. Instead of:

INPUT "Your name:", A$

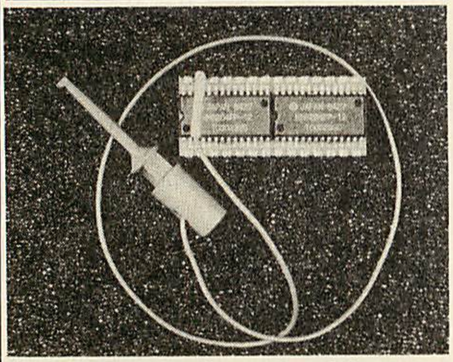
you would type

A$=FNinput ("Your name:").

The program works by breaking INPUT down into individual characters. Each character when typed in is printed in double height, and added to a string. DELETE removes a character from the string and the display.

£5

MASTER PROGRAM STORE



Richard Leggett from Norwich earns a fiver by reminding us that the sideways Ram banks of a Master can be used as a temporary storage area for Basic programs. Richard suggests that when you are about to make a major change to a Basic program, such as the deletion of a whole block of lines, it is a good idea to save it to sideways Ram first so that if you want to undo the change, you can do so simply by reloading from sideways Ram.

To do this, first prepare your Master sideways Ram to work in 'pseudo' mode, where *SRREAD and *SRWRITE 'see' the memory as one 64K block (minus 16 bytes). To do this, type:

```
*SRDATA W
*SRDATA X
*SRDATA Y
*SRDATA Z
```

Now set up two function keys as follows:

```
   *KEY 0 INPUT "Save to
 SRAM Y/N" Y$:IF Y$="Y"
THEN OSCLI "SRWRITE E00
+7200 0":PRINT "Saved OK
"

   *KEY 1 INPUT "Load fr
om SRAM Y/N" Y$:IF Y$="Y
" THEN OSCLI "SRREAD E00
 +7200 0":PRINT "Loaded
OK"
```

When you wish to save the current Basic program, simply press f0 and answer Y (not y). The program will be stored in sideways Ram and you can then alter or run it with impunity.

If you then wish to reload the version saved, simply press f1, and answer Y. The old version of the program will be restored to memory.

Note that as the routine stands, it saves the contents of memory up to &8000, which is correct, as this is the entire programming area if you are in shadow mode. However, if you are not working in shadow mode it's a different story. Part of the memory in question will be screen memory, which will reappear if you are in a non-shadow mode when you press f1.

In this case, note that if you are in a different non-shadow mode to the one you were in when you press f0, the screen contents will look rather odd. This doesn't however affect anything – just clear the screen and carry on.

The theory can also be extended to cover the saving of screens directly to sideways Ram, by using *SRWRITE n 8000 0, where n is 3000 for modes 0, 1 and 2, 4000 for mode 3, 5800 for modes 4 and 5, 6000 for mode 6, and 7000 for mode 7. Using the *SPREAD command with the same parameters and screen mode selected will restore the screen.

The problem with using function keys or typing the commands directly, is that the act of typing the command corrupts the screen display. These commands are therefore best used from a program.

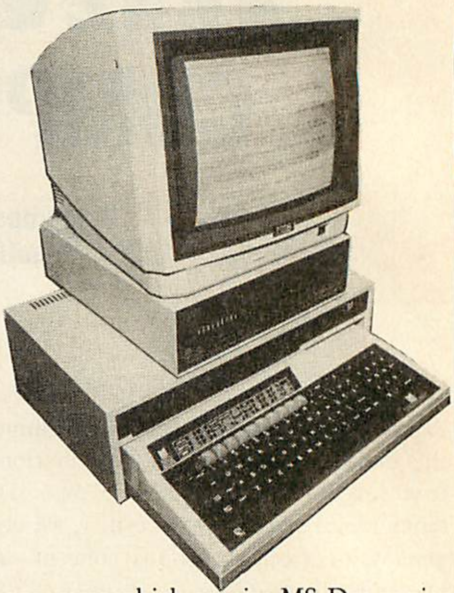
£5

MASTER 512 DOS VERSION

Martin Brewer of Eltham, London, who wrote in March concerning the Master 512 realtime clock, has offered another tip which gets a bit more software running on the system. Some packages interrogate Dos, to find out the version currently running. Almost all software requires at least version 2, and increasingly, many packages require MS-Dos version 3 – the current version.

Dos Plus, as supplied with the Master 512, is compatible with MS-Dos version 2.11 and when a program asks Dos Plus for the version number, this is the number returned.

However, Dos Plus has some more features than MS-Dos 2.11 and quite a few



programs which require MS-Dos version 3, would in fact run correctly with Dos Plus. One example is the well-known graphics package *DR Halo*.

However, as they stand these programs will simply terminate with the message 'Incorrect version of Dos'.

Other programs of interest are the MS-Dos version 3.30 utilities disc which, incidentally, is provided with the Archimedes PC Emulator.

To make these programs work on a Master 512, Martin hit on the idea of looking through the Dos Plus code to find the bytes where the '2.11' identity is stored, and changing them to contain '3.30', the latest version of MS-Dos. This does in fact prove to be the right thing to do, and this is how to go about making the changes.

First make a copy of your Dos Plus system disc (Master 512 Disc 1). Do not make the changes on your Master disc.

With your copy system disc in drive A, boot up to the point where the A prompt appears and type:

```
A>FSET *.SYS [DIR RW]
A>EDBIN
-r DOSPLUS.SYS
-e DA67
```

The screen will now display a list of bytes as follows:

```
1817:DA67 02 0B 2B C0
A3 DA 07 A3 DC 07 C3 C6
06 EE 07 FF
```

Move the cursor over the first byte (02), and change it to 03. Then move to the next byte (0B), and change it to 1E. As you have probably guessed, the first byte is the main Dos version number and the second byte is the sub-number, and you

have changed 2.11 to 3.30.

Now press CTRL-C and type:

```
-w DOSPLUS.SYS
-q
A>FSET *.SYS [SYS RO]
```

Dos Plus must now be rebooted so that the revised version can be loaded. CTRL-BREAK will do this.

The FSET command is a standard Dos Plus transient command (a program on the system disc) which alters the attributes of files. By default DOSPLUS.SYS is a 'system' file (a special one) as opposed to a 'directory' file (a normal one), and is set to read only (RO) status.

Before it can be altered with EDBIN, it must be made into a read/write (RW) directory file, as system files cannot be edited, and as you would expect, RO files can be read but not altered.

After the amendment has been made, the FSET command is used again to return the file to its former status. 'System' files are files that are used by Dos Plus itself and are not shown in normal directory listings, other than by a message at the end of a DIR listing to say 'System files exist'. You can however, list the system files on a disc by typing DIR/S.

After you have finished making the changes to DOSPLUS.SYS and rebooting, you could try some software which previously crashed with the 'Incorrect version of Dos' error. You may find that it now works correctly.

However, note that all you have done is fool the program. Many Dos version 3 programs may still not work on the Master 512 as they may use features within MS-Dos 3 (such as extended memory management or support for 1.2Mb drives) which are not supported by Dos Plus (or for that matter the 512 hardware).

Incidentally, don't all write in about a Dos Plus version 3. The current version of Dos Plus, version 2.1, is the final version of the operating system, and no further upgrades are planned by Acorn or indeed by anyone else.

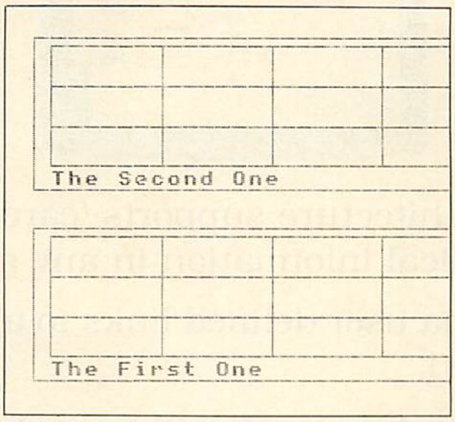
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KEYSTRIPS REVISITED

Function keystrip printers have been covered before over the last few years in this magazine but most of them have concentrated on getting the data into the individual slots, and not so much on the appearance of the strip.

The program supplied by Andrew Hinchcliffe of Barnsley which appears in this month's yellow pages takes a different approach. First of all, the keystrips are printed vertically down a sheet of paper, as the full width of a keystrip will not fit on A4 paper (horizontal keystrips only fit on fanfold paper which is a bit wider than A4) and secondly no attempt is made to include any key legends.

You must type or write these on afterwards, although it shouldn't be beyond the wit of some enterprising programmer to include this feature.



This ability to fit a keystrip on A4 paper is particularly useful, as other paper materials such as peel-off sheets, coloured paper, or thin card, can be used instead of ordinary white paper.

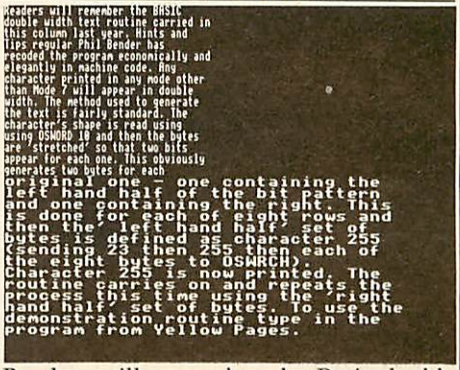
To create keystrips simply run the program as listed in the yellow pages. By default, this prints two keystrips but up to five can be fitted on an A4 page. The number of keystrips is determined by the variable T%, at the beginning of the program. The last line of the program contains data strings for the keystrip title. Each string may be up to eight characters in length and there must be at least as many items as the value of T%.

Other variables which can be altered if you wish to experiment are W%, which is the height of the keystrip (preset to 39) and must be a multiple of 3, U%, which is the distance between the keystrips in character spaces (preset to 3) and obviously can only be adjusted in conjunction with the total number of strips appearing on the page.

The program only works with Epson compatible dot-matrix printers. This is because it draws the lines using the Epson graphics facility. Also, the characters of the title string are printed in graphics form which is necessary as they are rotated through 90 degrees. This is done using the usual OSWORD 10 method of reading the character definitions from the BBC and transmitting the graphics patterns to the printer, in between the data for printing the lines. The end result on paper is a very accurate keystrip of pleasing appearance.

£5

DOUBLE WIDTH TEXT AGAIN



Readers will remember the Basic double width text routine carried in this column last year. Hints and Tips regular Phil Bender, has recoded the program economically and elegantly in machine code.

Any character printed in any mode other than mode 7, will appear in double width. The method used to generate the text is fairly standard. The character's shape is read using OSWORD 10, and then the bytes are 'stretched' so two bits appear for each one.

This obviously generates two bytes for each original one – one containing the left hand half of the bit pattern and one containing the right. This is done for each of eight rows, and then the 'left hand half' set of bytes is defined as character 255 (sending 23, then 255, then each of the eight bytes to OSWRCH). Character 255 is now printed.

The routine carries on and repeats the process, this time using the 'right hand half' set of bytes. To use the demonstration routine, type in the program from the yellow pages.

The procedure PROCPRINT will print any text in double width, provided that PROCASSEM has been run first.

Assembly language programmers can enter the routine at &900 with the accumulator set to the value of the character to be displayed.

Send your programs, hints and tips to Hints and Tips, BBC Acorn User, *Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.*

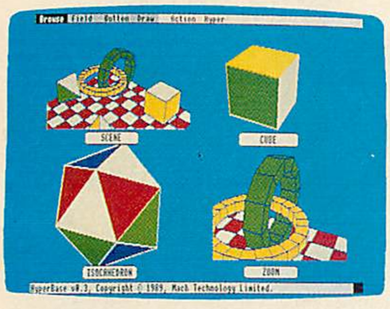
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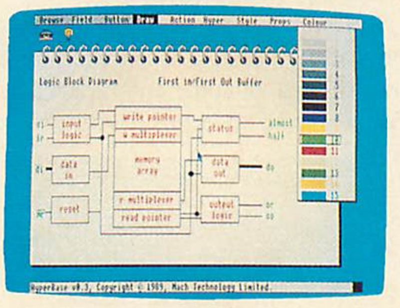
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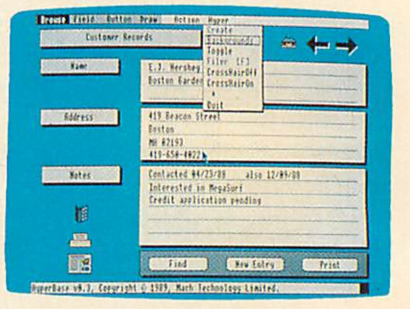
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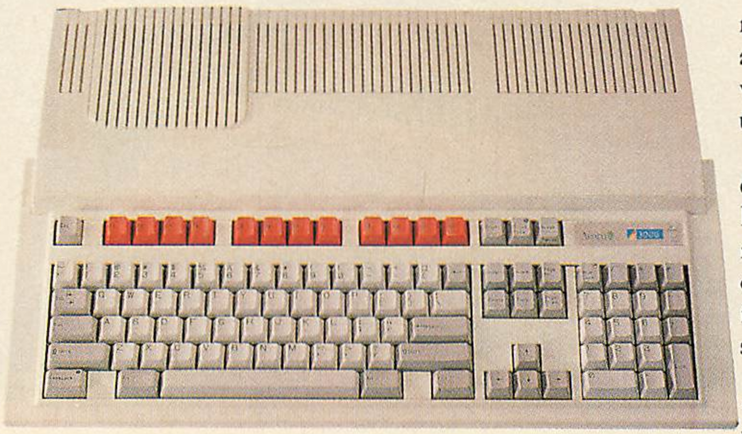
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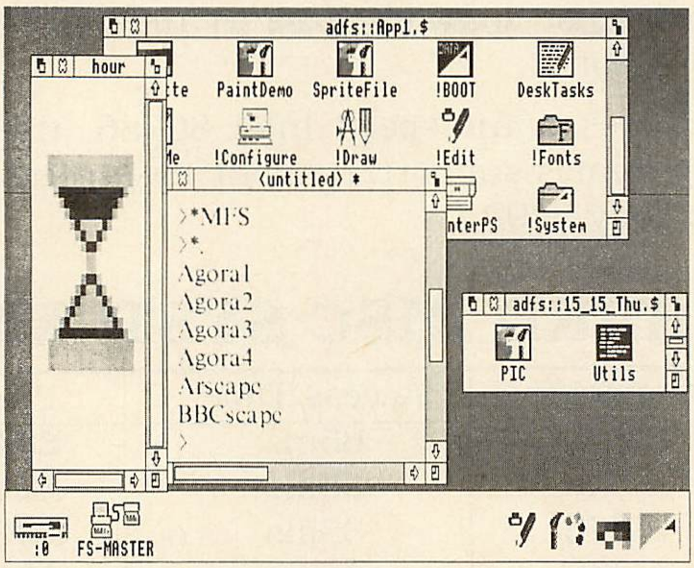
David Acton



Until the Archimedes came along, the prospect of writing your own filing system was rather daunting. However, things are different now, so here's a little example I hope you'll find both useful and informative.

It's a Module Filing System or MFS for short – rather like the Rom Filing System on the Beeb. Essentially, one or more files (of any type) are 'blown' into a relocatable module. Once this module has been loaded, *MFS will take you into the new filing system and all of the specified files are immediately to hand.

The MFS has two main uses. If you have a set of Basic programs which CHAIN each other, putting them in the MFS means the end of whirring discs – just load them all in one go at the start. This is particularly handy if you need to save or load data on floppies as it avoids lots of disc-swapping.



Another use of the MFS is to include an MFS module in a podule Rom. This is an easy way of putting Basic and other programs in permanent memory.

Listing 1 does all the business. Use it as follows. First specify the maximum size you want your module to be. Remember, it will have to fit in the available memory of the machine (or podule Rom) and leave enough space for your programs to operate in. A default maximum of 64K is offered and 4K of the allocated space is set aside for module headers and so on.

Now enter the names of the files you want to include in the module. You will be told if a file does not exist or is too big to be included and you may enter star commands if you wish. Note that the files specified will not be loaded until you have finished entering all the names – so ensure all necessary files are on the currently inserted disc.

After entering a valid filename you will be asked what name the file is to be saved under in the MFS. No check is made for illegal characters, so be sensible!

Remember, directories are not supported by the MFS but filenames may be of any length. When ready to make the MFS module press RETURN by itself and give the name that you want the module to be saved under.

The MFS is really only designed to allow a number of Basic programs to be held in memory simultaneously so only a few of the standard filing system operations are supported.

Load an MFS module using *RMLOAD and enter the MFS by typing *MFS. You can catalogue the MFS directory in the usual way and you can either CHAIN or LOAD programs as normal too.

You needn't go into MFS either but may use an FS prefix instead. For example, CHAIN"MFS:Noodles" will load the Basic program "Noodles" from the MFS and run it without leaving the current filing system.

All this is made possible by the File Switch module. When issuing a CHAIN command in Basic, this in turn issues various SYS "OS_File" commands. In turn, filing system calls such as 'OS_File" are indirected to the appropriate handlers in the current filing system. So, put simply, when defining your own filing system, all you need to do is tell FileSwitch what your filing system is called and the location of your own routines to handle things like "OS_File" calls. Let's see how our module does it.

When the module is loaded, .intmod is called and this declares that the module contains a filing system by calling "OS_FSControl" with R0 = 12. R1 points to the base of the module and R2 contains the offset to a filing system 'info' block.

This block consists of a number of offsets to messages and 'handlers' and also includes an FS number.

Each filing system must have a unique number and this should be allocated to you by Acorn. For the purposes of this demonstration I've used 42 but this is a little 'naughty'.

Our module, being simple, responds only to three calls. The rest are directed to the routine .badop which just produces a 'not supported' error.

.fsentry is called when an "OS_File" sort of operation is performed. You respond to two – "OS_File",5 which returns information about a file and "OS_File",255 which loads a file. The files you've chosen to include are stored at the end of the module after tables containing their lengths, load and execution addresses.

The only other call you take notice of is .fsentryfunc with R0 = 2. This happens when a *CAT is performed and your routine simply prints out the names of the files in the module.

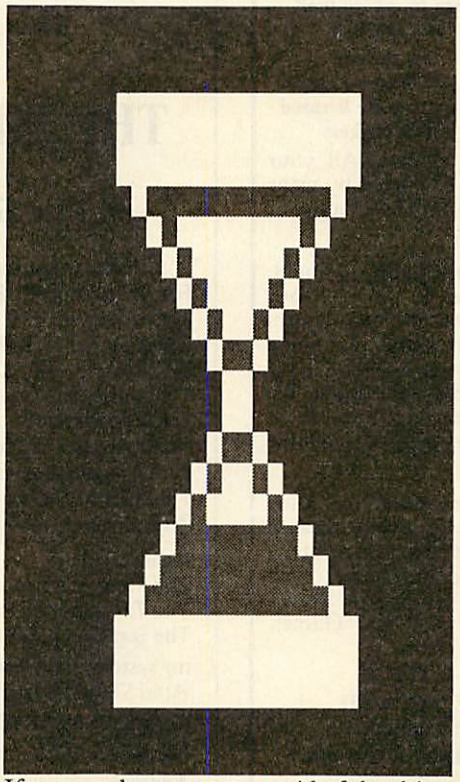
FileSwitch enables the user to respond to as few or as many filing system operations as desired. For a full description, have a look at the filing system section of part 1 of the Programmer's Reference Manual. Risc OS has further enriched the possibilities of creating filing systems by making the 'core' of the ADFS available to the user. In this way, you can make your own 'ADFS-like' filing system (such as the built in Ram disc) and leave the operating system to worry about disc maps and the like.

£5 HOURGLASS FIGURES

A module new to Risc OS is that of the hourglass. Essentially, the pointer is turned into a little egg-timer affair while the computer is busy doing something. Iain Oglesby of Warrington in Cheshire has been experimenting and provides listing 3 on the yellow pages to show how easy the hourglass is to use.

The hourglass module provides a number of SWI calls which, like any other, may be used from Basic or machine-code. SYS "Hourglass on" simply changes the standard pointer shape into the hourglass symbol and SYS "Hourglass_Off" changes it back.

Calls to switch the hourglass on and off can be 'nested' in that if you issue n 'Hourglass_On's the pointer will only change back after the nth 'Hourglass_Off'.



If you are desperate to get rid of the thing though, you could resort to the dramatically named SWI call "Hourglass_Smash".

The basic hourglass shape may be enhanced by adding a percentage (00 to 99) underneath. This feature can be employed to give the user more of an idea of how the task in hand is progressing. You might notice percentages being used by the Network Filing System or by the *!Paint* application when it's doing something hefty like rotating a picture through an awkward number of degrees. SYS "Hourglass_Percentage",p adds the percentage value 'p' to the base of the pointer.

Iain's demonstration shows the basic hourglass calls in action. Of course, your program would rarely be doing things in 100s so you would have to do a little multiplication to get the percentage variable in the range 0–99.

You'll note that the OS doesn't constantly update the pointer shape. This is presumably because the machine is busy doing something anyway and there's little point in slowing itself up further...

There are two SWI calls available. SYS "Hourglass_Start",d performs a similar operation to "Hourglass_On" but will only switch on after a delay of 'd' centiseconds. ("Hourglass_On" has a fixed delay of about 1/3 second). The reason for the delays is that it may not always be necessary to alert the user to the fact that something is actually happening.

Finally, you may also switch one or both LEDs (well, that's what Acorn has called them) located on the hourglass. This is done with SYS "Hourglass_LEDs". To read the LEDs' status use:

SYS "Hourglass_LEDs",,3 TO state

To set them use:

SYS "Hourglass_LEDs",state

Only the bottom two bits of the variable 'state' are relevant.

£10 PG TIP

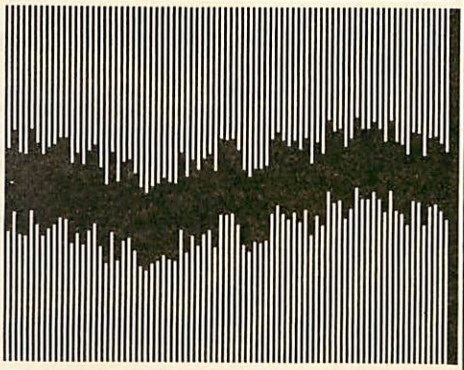
The PG in this instance is Patrick Griffin of Limerick. His tip is all about the time and date and his program is listing 2 on the yellow pages.

The user has a great deal of control over how the time and date are displayed on the Archimedes. The OS call "OS_ConvertDateAndTime" does the work and takes as one of its parameters a 'format' string. This string can contain both standard text and 'pseudo' variables (preceded by %). These are translated by the OS into the desired values.

For example, %dn is used to display which day of the year it is. If the % is followed immediately by z then leading zeros are omitted from the final output.

Patrick uses "OS_ConvertDateAndTime" (as opposed to "OS_ConvertStandardDateAndTime" which is quite the most absurd SWI name in existence) to full effect, providing a variety of useful time and date displays.

£10 SMALL GAME



We round off this month's offerings with a one-liner from Danish readers Sten Hougaard and Lars Østerballe. To play their game use the up and down arrow keys. You can work out the rules for yourself.

Send your programs, ideas, hints and tips to: Arc Agora, BBC Acorn User, *Redwood Publishing, 20–26 Brunswick Place, London N1 6DJ. Join the* BAU *elite and have your own code splashed across these celebrated sheets.*

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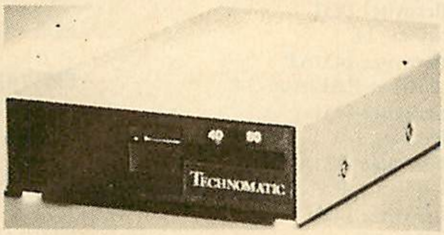
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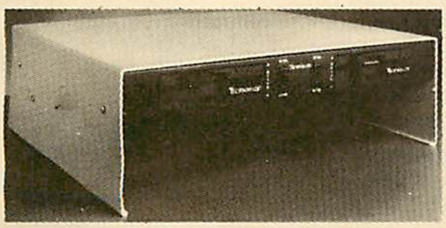
TECHNOMATIC

Techno House 468 Church Lane, London NW9 8TQ. Tel: 01-205 9558 Fax: 01-205 0190

TECHNOMATIC DISC DRIVES



TS 400



PD 800P

A range of high quality high performance drives to meet the needs of all BBC Micro Users.

*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering fast track access and head setting times.

*5.25" floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with a suitably fused 13A moulded plug.

*TECHNOMATIC drives stand out from other drives because of elegance in design, high quality of construction and use of reliable switch mode power supply units (on dual drives).

*Our plinth drives have been thoughtfully designed and provide a choice of two 5.25" drives or a combination of 5.25" and 3.5" drives. The plinth drives are designed to give a professional look to the system installation and at the same time provide considerable space saving. Their rugged construction ensures that there is no sagging under the weight of even a 20" monitor.

5.25" Single Drives 40/80 switchable:
TS400 400K/640K **£80(b)**
PS400 400K/640K with integral mains power supply **£90(b)**

5.25" Dual Drives 40/80 switchable:
TD800 800K/1280K **£160(a)**
PD800 800K/1280K with integral mains power supply **£170(a)**
PD800P 800K/1280K with integral mainspower supply and monitor stand **£185(a)**
PD800 Case with psu & data cable **£42(b)**
PD800P Case with psu & data cable **£75(a)**

PS400/PS351 are Compact/Archimedes compatible.
PD800/PD352/PD853 are Archimedes compatible.

3.5" 80T DS Drives:
TS351 single 400K/640K **£69(b)**
PS351 3.5" single drive with integral mains power supply in a 5.25" case. **£95(b)**
TD352 Dual 800K/1280K **£126(a)**
PD352 3.5" dual drive with integral mains power supply in a 5.25" case. **£139(a)**

Combo Drives (5.25" & 3.5" drives)
PD853 with integral psu **£180(a)**
PD853P with integral psu **£205(a)**
(Combo drives in plinth mounting).

DISC DRIVE MULTIPLEXER
For Master, B, B+ and any DFS/ADFS
TDM2 Two computers/one drive unit **£65(b)**
TDM4 Four computers/one drive unit **£115(b)**

SPECIAL OFFER

TS200 40T DS
only **£65(b)**
(offer valid whilst stock last)

AEDA
ARCHIMEDES EXTERNAL DRIVE ADAPTOR

Technomatic's AEDA provides a reliable external disc drive adaptor with a variety of novel features.

★ It is designed for easy and neat installation and takes only a few minutes to instal. Rear fixing plate is supplied in two halves so as not to interfere with existing expansion boards or those likely to be installed in future.

★ It is fully buffered and allows up to three external drives (3.5" or 5.25") to be connected.

★ Externally located toggle switch allows selecting either internal or external drive as drive 0 or drive A. This feature is particularly useful when booting up from the external drive is required.

★ AEDA is supplied configured for one internal and up to three external drives. On board options allows for reconfiguration to two internal and two external drives.

★ Other on board options allow setting 'disc eject' from the keyboard if the drive is capable of this facility.

Technomatic AEDA **£30(c)**

MASTER COMPACT ADD-ONS

128K RAM, 640K 3.5" DS Drive + Educ software and our bundled Educ/Fun package included

Entry System	**£310(a)**
with 12" Mono Monitor	**£375(2×a)**
with 14" Col Monitor	**£475(2×a)**

2nd Drive Kit	**£90(c)**	Serial Kit	**£25(d)**
Mertec Adaptor	**£35(c)**	TV Modulator	**£26(d)**
Ext Drive Adaptor	**£9(d)**	Printer Lead	**£7(d)**

WINCHESTER DRIVES

Most popular range of Winchesters for BBC at competitive prices.

Single Winchesters, housed in attractively styled metal enclosures in BBC matching beige colour are fan cooled and powered by switch mode power supply for quiet, efficient and reliable operation.

Winchester/floppy combination drives, housed in our elegant plinth housing.

To get the most from the Winchester, the following utilities are installed on the drives:

★ TREE PLAN: A utility to create an organised directory structure and display it on the screen or dump it to a printer.
★ Formatter and verify program.
★ For Master users our popular front end utility to display the entire contents of the drive in icon format. Files can be loaded simply by pointing at the icons.

P30HD 30Mb Winchester **£410(a)**
P304HP* 30Mb Winchester + 640K DS 40/80T floppy **£609(a)**
*(mounted in plinth type casing)
Larger drives available on request.

UPGRADE KITS

1.20S ROM	£15(d)	ADFS ROM	£26(d)
DNFS ROM	£19(d)	1770 DFS Kit	£49(d)
BASIC II ROM	£22.50(d)	Econet Kit	£55(d)

RAM/ROM EXPANSION

ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms +2*8K RAMS **£37(c)**
ATPL Battery backup kit **£18(d)**

3M FLOPPY DISCS

5.25" Discs in packs of 10

744 40T SS DD	**£6.50(d)**
745 40T DS DD	**£7.00(d)**
746 80T SS DD	**£12.00(d)**
747 80T DS DD	**£11.00(d)**

(Add £1 for library case packing)

3.5" Discs in packs of 10

80T SS DD	**£10.00(d)**
80T DS DD	**£11.75(d)**

BULK DISCS

50 5.25" 40 T single sided discs with sleeves in lockable box. **£20(b)**
50 5.25" 80 T double sided discs with sleeves in lockable box. **£25(b)**
40 3.5" 80T DS Discs in lockable box **£38(b)**

FLOPPICLENE DRIVE HEAD CLEANING KIT
5.25" Kit with 20 disposable discs **£14.00(d)**
3.5" Kit with 20 disposable discs **£14.75(d)**
Conventional DriveHead Cleaning Kit **£4(d)**
(pse specify 3.5" or 5.25")

DISC STORAGE BOXES
DB340 Lockable 40 × 3.5" **£6(c)**
DB380 Lockable 80 × 3.5" **£7(b)**
DB550 Lockable 50 × 5.25" **£6(c)**
DB100 Lockable 100 × 5.25" **£7(b)**

EPROMS/RAMS

2764-25	**£2.80**	27256-25	**£6**
27128-25 (12.5vVpp)	**£4.50**	27128-25 (21vVpp)	**£6**
27512-25	**£9**	6264LP-15	**£6**

These prices subject to change (Carriage code d)

All prices ex VAT and subject to change without notice. See page 6 for Carriage Charges.

TECHNOMATIC

Techno House 468 Church Lane, London NW9 8TQ. Tel: 01-205 9558 Fax: 01-205 0190

PRINTERS & PLOTTERS

EPSON

LX800	£145	LQ500	£245
FX850	£285	LQ850	£405
FX1050	£395	LQ1050	£569
EX800	£429	LQ2550+	£919

GQ3500 Laser £1199

NATIONAL PANASONIC

KXP1081 incl Master Lead £139

KXP1124 £269 KXP1540 £435

INTEGREX

132 Inkjet Colour £515

COLOURCELL Inkjet £2750

PLOTTER

Hitachi 672XD A3 4 col £475

Plotmate A4S £379

Plotmate A3M £549

Roland A3 FLATBED PLOTTERS

DXY880A	£510	DXY1100	£625
DXY1200	£865	DXY1300	£1025

All above items are carriage (a).

STAR

LC10	£149	LC10 Col	£199
LC24-10	£269	NB24-10	£449

TAXAN

KP815 £155 KP915 £275

NEC

P2200 £269 P6+ £439

P7+ £579

HP

Laserjet Series II Laser £1349

Deskjet £520

PRINTER ACCESSORIES

SERIAL INTERFACES

Epson 8143	£32(d)	Epson 8148 (8K buffer)	£79(d)
Nat Pan KXP17	£39(d)	Taxan	£49(d)

RIBBONS

LX80/86/800, MX/RX/FX80/85/800/850	£4(d)
MX/RX/FX100, FX105/1000/1050	£6(d)
LQ500/800/850	£5(d)
LQ1000/1050, EX800/1000 (Black)	£8(d)
EX800/1000	£16(d)
LQ2550, JX80	£13(d)
StarLC10/NL10, NatPan KXP1081	£4(d)
LC10 Colour	£6.50(d)
Taxan 810/815/910/915	£5.75(d)
Integrex Black Cartridge	£10.50(d)
Integrex Colour Cartridge	£16(d)
Juki 6100 £1.80(d) Brother HR15/20	£4(d)
HI80 Pens (4) (Aqueous or Oil Based)	£6.90(d)
Hitachi Pens (6) Aqueous £18.50(d) Oil	£25(d)
Colour option EX800/1000	£35(d)

CUT-SHEET FEEDERS

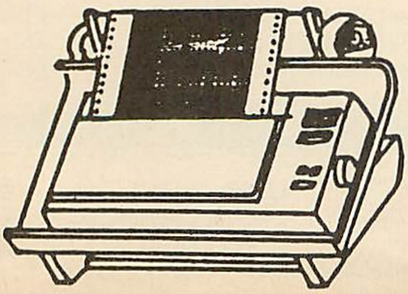
LX800	£70(b)	LQ500	£75(b)
FX/LQ/800/850	£135(b)	FX/LQ1000/1050	£179(a)
EX800	£150(b)	EX1000/LQ2500	£210(a)
Star LC10	£55(b)	Brother HR20	£229(a)

TRACTOR FEEDS

LQ800	£44(b)	LQ1000	£55(b)
LQ850	£70(b)	LQ1050	£85(b)

PRINTER STAND

A new style printer stand with easy paper feed and paper seperation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. **£26 (b)**

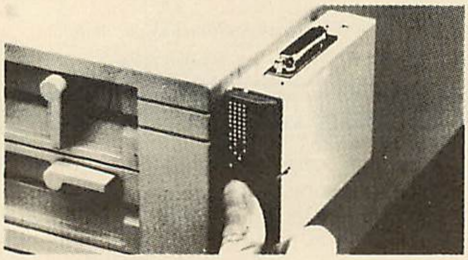


BUFFERS & SHARERS

TSB 256 Auto Sharer/Buffer
256K buffer with 3 input ports. Each port scanned automatically every 10 secs until data found. PAUSE, COPY and RESET Facilities. Full spec on request. **£169(a)**

Smart Printer Buffer 256K
256K parallel buffer with facilities for 256 copies. PAUSE, RESET & SELF-TEST **£149(b)**

Compact Two Way Switch
A economical solution for connecting two computers to one printer or one computer to two printers. Easily attaches to the side of compute or monitor (specify parallel or serial) **£19(c)**



Manual Printer Sharers:
(All lines are switched).

	Parallel	Serial
2 computers to one printer	£23(c)	£23(c)
3 computers to one printer	£30(c)	£30(c)
4 computers to one printer	£36(c)	£36(c)
2 computers to 1 or 2 printers	£49(c)	£49(c)

Cable sets for above sharers available for all popular computers

BBC Computer Sharer: TCS26
1 computer to 2 printers fitted with BBC cable £15(c)

Parallel Printer Leads

BBC/Master (1.2m)	£5(d)	BBC/Master (2m)	£7(d)
Archimedes (2m)	£7(d)	Compact (1.2m)	£7(fd)

Paper & Labels
Plain fanfold paper with microperforations:

2000 sheets: 9.5" x 11"	£11(b)
14.5" x 11"	£18 (£4.50)
1000 sheets: A4 80gsm	£11(b)
A4 90gsm	£12(b)
500 Loose A4 plain sheets	£3(c)
50 sheets Art paper 115gsm A4 £3(c) A3	£5(c)
100 sheets A4 OHP film	£45(b)

Labels/1000

Single Row 3½" x 1⁷⁄₁₆"	£5(d)
Double Row 3½" x 1⁷⁄₁₆"	£5(d)
Triple Row 2⁷⁄₁₆" x 1⁷⁄₁₆"	£5(d)

MONITORS

12", 14" and 20" MONITORS

Microvitec 1431
Std Res, 14" **£175(a)**

Microvitec 1431AP
Std Res + PAL/Aud, 14" **£199(a)**

Microvitec 1451
Med Res, 14" **£219(a)**

Microvitec 1451AP
Med Res + PAL/Aud, 14" **£255(a)**

Microvitec 1441
Hi Res, 14" **£359(a)**

Dust Cover for Microvitec 14" monitors **£5.50(d)**

Philips 8833 14" RGB
Med Res, 14", high contract screen, TTL/Linear input, Mono/Colour Switch Stereo Sound Input. Separate controls for brilliance and contrast. **£209(a)**

Touchtec 501 **£239(a)**

Acorn Philips
14" Colour Monitor **£199(a)**

Microvitec 2030CS
20" Standard Resolution RGB/Comp Video **£380(a)**

Microvitec 2040CS
20" High Resolution RGB/Comp Video **£675(a)**

TAXAN SUPER VISION 625
12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible. **£269(a)**

TAXAN 770+
MultiSysnc Autoscan 14", ideal for utilising te hi res modes on Archimedes. Our price includes a tilt & swivel stand **£429(a)**

VIKING II
19" Hi Res white screen monitor for CAD applications c/w Tilt & Swivel stand **£849(a)**

CM1686 16"
Hi Res colour monitor for use with hi res modes on 400 series. Res: 1280 x 1024. Complete with tilt & Swivel base **£1499(a)**

MONOCHROME MONITORS

PHILIPS 7502
Hi Res green screen **£72(a)**

PHILIPS BM 7522
Hi Res amber screen **£79(a)**

Tilt & Swivel Stand for Philips Mono **£6(c)**

MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors)	£10(c)
Monitor Stand Models B & B+	£10(c)
Monitor Stand Master	£13(c)
Double Tier Stand Models B, B+ or Master	£24(b)
Taxan RGB Lead	£7(d)
Microvitec Lead	£4(d)
Monochrome BNC/Phono Lead	£4(d)
Copy Holder Self Supporting A4	£15(c)
General purpose tilt and swivel stand for 12" and 14" Monitors	£12(b)

MODEMS & SOFTWARE

MIRACOM WS4000 V21/V23	£115(b)	Termulator (B/B+)	£25(d)
MIRACOM WS3000 V22	£275(b)	Termulator (M)	£35(d)
MIRACOM WS3000 V22bis	£395(b)	MAYA (B/B+/M/Arc)	£49(d)
PACE LINNET V21/23	£129(b)	Commstar II (B/B+/M)	£28(d)

All modems carry a BABT Approval

TECHNOMATIC

Techno House 468 Church Lane, London NW9 8TQ. Tel: 01-205 9558 Fax: 01-205 0190

BBC FIRM/SOFTWARE

INTEGRATED PACKAGES

MEGA 3 ROM	£76(c)
Three ROMS in one Interword/Intersheet/Interchart	
MINI OFFICE	
The most economical package you can buy.	
Disc for Model B & B+	£14(d)
Disc for Master	£16(d)
Disc for Compact	£19(d)
(please specify 40 or 80T Disc)	
ROM Version (B,B+, M&C)	£43(c)

WORD PROCESSORS

Acorn View Professional	£50(c)
VIEW 2.1	£35(d)
VIEW 3.0	£45(c)
Double View Disc	£15(d)
View Printer Driver	£9(d)
WORDWISE	£24(d)
WORDWISE PLUS	£38(d)
INTERWORD	£36(d)
SPELLMASTER	£42(d)
EDWORD II	£39(c)
WYSIWYG PLUS	£15(d)
(What You See Is What You Get)	
A screen and printer utility ROM	

DATABASE SYSTEMS

Viewstore	£36(d)
Overview (for Master or Compact)	£65(b)
InterBase	£49(d)
STARdataBASE	£29(d)

SPREADSHEETS

Viewsheet	£36(d)
Windomatic	£15(d)
(utility to release the power of Viewsheet)	
Intersheet	£37(d)
Interchart	£25(d)

LANGUAGES

Acornsoft C	£29(d)
Acorn MicroProlog	£49(d)
ISO PASCAL	£51(c)
ISO PASCAL SAG	£30(d)
Oxford Pascal (B,B+)	£32(d)
Oxford Pascal (M)	£32(d)
Logotron Logo	£49(c)

NOVACAD (B,B+,M)

NOVACAD T/M Version	£39(d)
NOVACAD + Plotter DG	£49(d)
Plotter Driver Generator	£12(d)
*Techno*CAD	£99(c)

MARCONI TRACKER BALL

RB2 Stand Alone	£49(c)
(Specify if AMX compatibility reqd)	
RB2 with Pointer Rom (M)	£59(c)
RB2 with Icon Master (B,B+)	£59(c)

UNIVERSAL DEVELOPMENT SYSTEM

A set of three packages to meet the needs of any software developer for assembling, disassembling and emulating codes for over 30 processors. Packages are structured to work with new processors.

META Assembler	£90(b)
META Disassembler	£90(b)

COMMUNICATIONS

Termulator (B, B+)	£25(d)
Termulator (M,C)	£35(d)
MAYA Terminal Emulator	£49(d)
(Disc with ROM Image (B,B+, M,C,A)	
MAYA Terminal Em. ROM	£7(d)

PRINTER UTILITIES

Dumpmaster ROM	£26(d)
(screen dump utility for a variety of printers incl colour printers)	
Screen Print	£25(d)
(a powerful printer dump utility)	
Printmaster	£24(d)
(Versatile utility for Epson printers)	
WYSIWYG plus	£15(d)
Printer drive for any printer, compatible with View, WW, Interword. On Screen display of the actual typestyles/fonts chosen.	

UPGRADES

ADFS ROM	£26(d)
1770 DFS Kit	£49(c)
DNFS ROM	£17(d)
1770 DFS ROM	£15(d)
1.2 OS ROM	£15(d)
BASIC II ROM	£22.50(d)

BBC PUBLICATIONS EDUCATIONAL SOFTWARE

PRIMARY EDUCATION

Astronomy	£8(d)
Computers At Work Aud/Disc	£16(c)
Picture Craft	£17(d)
Introducing Geography	£15(d)
The Hall of Mirrors	£13(d)
Geordie Racer	£12(d)
Bird Spy	£8(d)
Maths Aud/Disc	£12(d)

SECONDARY LEARNING

Technology & Design Pt 1	£21.50(c)
Electric Fields	£8(d)
'A' Level Statistics	£19(d)
'A' Level Geography	£13(d)
Inside Information Prog/Cass	£10(d)
Book £8(d) Aud	£5(d)
Open Learning Pack D/Aud/Bk	£36(b)
Science Topic (ST): WAVES	£7(d)
ST: RELATIONSHIPS	£7(d)
ST: BONDING	£7(d)
ST: ElecMag. Spectrum	£7(d)
ST: Electronic in Action	£7(d)
ST: Newton & The Shuttle	£9(d)
ST: ECOLOGY	£9(d)
ST: POLYMERS	£9(d)
ST: Classif. & Periodic Tab	£10(d)
ST: Food & Population	£10(d)
Sec Science (SS) Microtech	£7(d)
SS: Mole Concept Disc/Aud	£10(d)

TIME WARP for Models B & B+

Upgrade your model B or B+ computer to provide real time and date information at any time. Time Warp with battery back up fitted as standard simply plugs into the User Port. Demo Software on Disc includes a diary/planner application. **£29(d)**

SPARE PARTS

BBC B/B+ Power Supply	£52(b)
BBC B keyboard	£52(b)
BBC B Keyboard Connector	£4.75(d)
BBC B/B+ Video ULA	£18(d)
BBC B/B+ Serial ULA	£12(d)
KeySwitch B,B+, M	£1.75(d)
(pse specify original type)	
UHF Modulator	£4(d)
16Mhz Xtal	£2.50(d)
17.734 MHz Xtal	£2.50(d)
6502A	£5.50(d)
4816 RAM (B)	£2(d)
Master psu	£59(b)
Master Keyboard	£62(b)
Keyboard Connector set (M)	£5(d)
1Mb OS ROM M	£39(d)
CF30060 ULA (M)	£10(d)
CF30047 ULA	£15(d)
ULA (512)	£34(d)
ULA (6502 & Z80 2nd Proc)	£28(d)
Power Supply (2nd Proc)	£42(b)
ARC Keyboard Assy	£85(b)
Arc Power Supply	£65(b)
Mouse	£49(c)
Drive Cable	£5(d)
Keyboard Curly Cable	£22(c)
Window Moulding	£6(d)
41464	£8(d)

(If the parts you need are not listed above please call us)

MISCELLANEOUS

Single Drive Case (no psu)	£10(d)
Dual Drive Case (inc cable/psu)	£42(b)
Plinth Case (inc cable/psu)	£75(d)
Drive Data Cable Single £5(d) Dual	£6(d)
Drive Power Cable Single £3(d) Dual	£4(d)
Econet Cable 5pin DIN/5 pin DIN	£3(d)
ROM Extraction Tool	£2(d)

EPROM ERASER

UVI Eraser: Compact eraser in smart case, can erase six eprom at a time. Safety cut out switch ensures no exposure to UV rays when the carrier tray is drawn out. **£47(c)**

UVIT Easer: As above but with a built-in timer so that you do not have to worry about over exposure and damaging the eproms. **£59(c)**

GENERAL

Vu-Type	£7.50(d)
Vu-Type Professional	£19(d)
White Knight Mk II	£16(d)
(pse specify Compact or 1770DFS)	
Battlefields Cass	£5(d)
Espana Viva Disc	£19(d)
Book £6.95(d) Disc/Aud (2)	£7(d)
Black Queen (1770DFS)	£13(d)
Bismark (1770DFS)	£13(d)

Codes: **Cass:** Program on Cassette. **Aud:** Audio Cassette. **Disc or no Code:** Program on disc
Above Programs are suitable for BBC B, B+ & Master

All software in this advertisement has been tested to work with appropriate Acorn Disc Filing Systems only and we are unable to comment on compatibility with any other filing system. It will be the buyers responsibility to verify such compatibility.

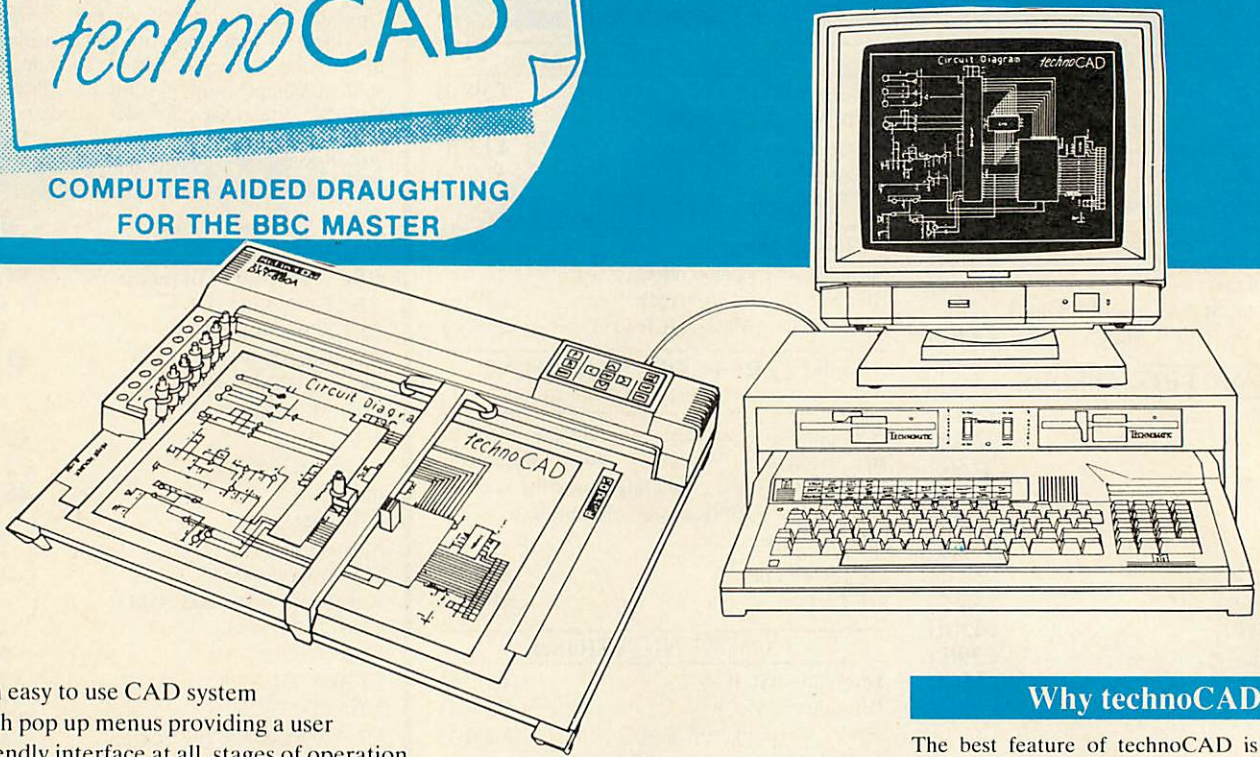
All prices ex VAT and subject to change without notice. See page 6 for Carriage Charges.

TECHNOMATIC

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technoCAD

COMPUTER AIDED DRAUGHTING FOR THE BBC MASTER



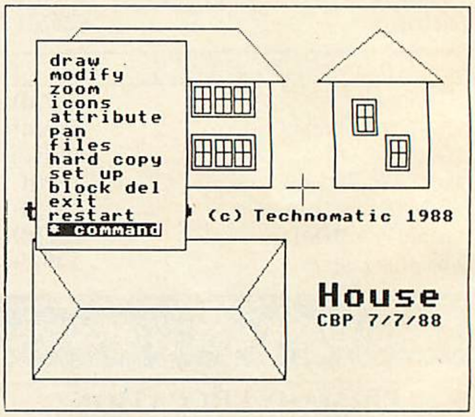
- ★ An easy to use CAD system with pop up menus providing a user friendly interface at all stages of operation.
- ★ Input can be configured for keyboard, mouse or tracker ball. Only three keys to input all commands if input from keyboard.
- ★ Virtually no limit to the size or complexity of the drawing that can be created. Powerful zoom facility allows a A0 size drawing to be viewed from single screen or a single screen can be enlarged to A0 size. Continuous panning across a drawing by specifying co-ordinates.
- ★ Lines, arcs and circles can be drawn with ease and in user defined colour and thickness. These can be modified at any stage of drawing.
- ★ User definable grid and scale, together with on screen display of dimensions, and co-ordinates enable easy and accurate drawings.
- ★ Multi layering capability with 8 levels allows superimposition of drawings.
- ★ Powerful icon utility allows any shape or drawing to be saved to a library as an icon. Icons can be recalled from the library and placed anywhere on the screen drawing at required scale and orientation.
- ★ Toolkit program allows customisation of files, utilities and peripherals.
- ★ Drawings can be scaled on screen to suit the plotter or printer in use. A maximum resolution of 0.01mm is available. Pre-configured drivers for many popular plotters and a driver generator for any BBC compatible plotter is included. Printer drivers for Epson 9 pin and 24 pin printers are included as standard as is the facility for installing drivers for other printers. Printers will output in landscape or portrait format.

FREE EVALUATION DISC AVAILABLE
Phone for your copy
£99(c)

Why technoCAD

The best feature of technoCAD is not its outstanding performance, not its unique ability to allow creation of complex icons, not the quality of output from printers or plotters. The best feature is the unprecedented ease with which it can be mastered. With easy to use single key commands limited to three keys, pull down menus and a clear and concise, easy to read manual, technoCAD is truly the system any one can use.

technoCAD will meet the needs of most professional applications and is an ideal tool for teaching CAD in technical schools, CDT departments and colleges.



BOOKS

No VAT Carriage Code (c)

LANGUAGES
- 6502 Assy Lang Prog £10
- 6502 Programming £8
- 8086 Book £23.95
- Acorn FORTH £8
- Acorn LISP £8
- Acorn ISO Pascal Ref Manual £8
- BASIC ROM User Guide £9.95
- 30Hr BASIC £7.50
- Intro to COMAL £8
- Master Reference Manual I £14
- Master Reference Manual II £14
- Micro Prolog Ref Manual £8

BBC MICRO GUIDE BOOKS
- Inside Information £8.95
- Maths Prog in BBC Basic £5.95

ARCHIMEDES
- Archimedes Reference Manual £29.95
- Arc. Assy. Lang. Prog. £14.95
- Inside Autosketch £12
- Operation Archie £14.95

PROGRAMMING/UTILITY
- Advanced Sideways Ram User Guide £8
- Advanced User Guide (BBC) £15.95
- New Advanced User Guide £19.95
- Assy. Lang. Prog. BBC £10.50
- Mastering Assembly Code £6.00
- Mastering Interpreters & Compilers £10.00
- Master Operating System £6.95
- Mastering View, Viewsheet & Viewstore £8.00
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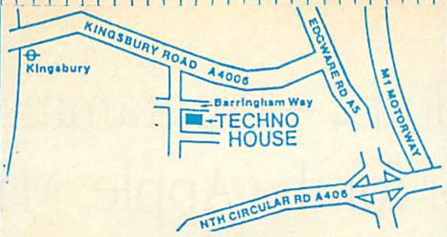
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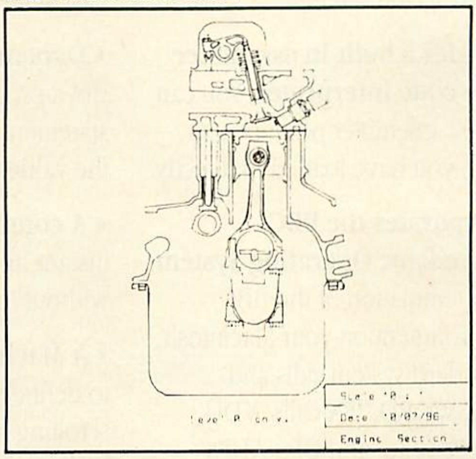
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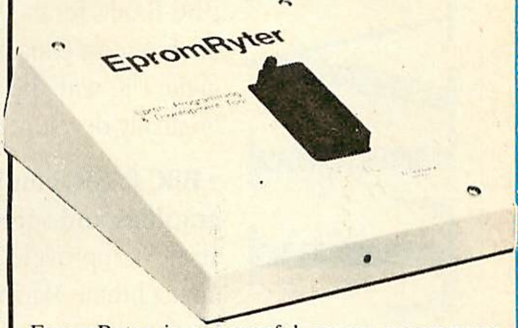
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- **BBC BASIC includes the File»Mac transfer utility** which will transfer programs and data files between the BBC Microcomputer and Macintosh. Even !BOOT files can be transferred, and can then simply be double-clicked to run programs.

...with all the advantages of the Apple Macintosh:

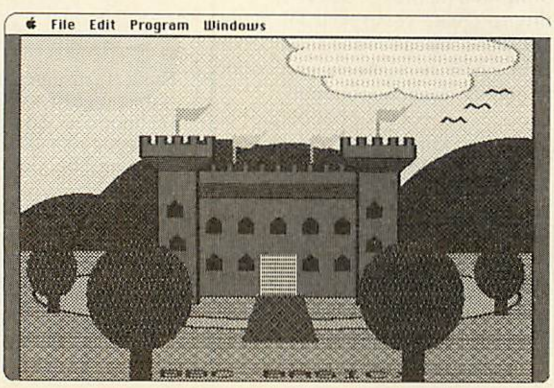
BBC BASIC takes advantage of the advanced features of the Macintosh to provide a fast and powerful environment in which to develop, test, and run your BASIC programs.

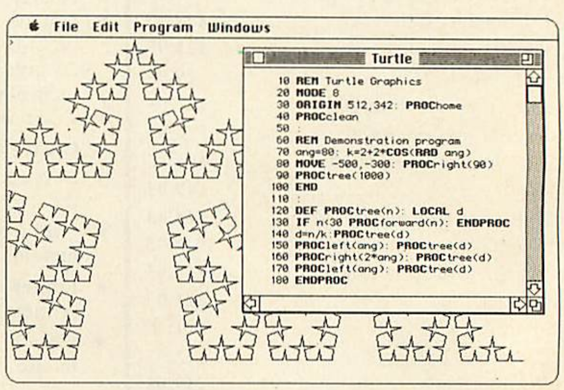
- **A Macintosh-style interactive editor** provides a scrolling view of program listings with convenient cursor or mouse editing. You can work with any font available on your system and you can display keywords highlighted in bold for easy reference.
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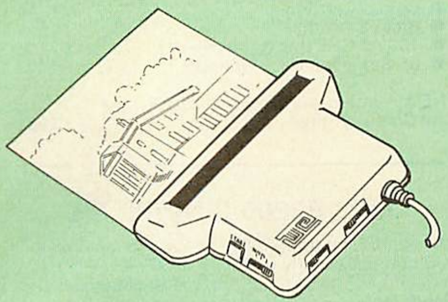
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NEW

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Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £149. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are.

Cropping and scalling to any size including stretching and squashing in X and Y directions separately.

Colour tinting.
X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

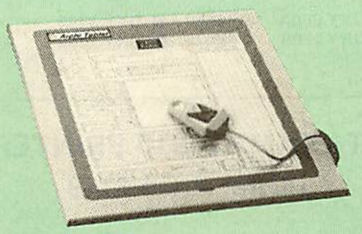
Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

£149

NEW

Archi Graphic Tablet



This package allows Archimedes users to take advantage of the excellent Aries low cost graphpad (sometimes called a digitiser tablet, but not to be confused with a video digitiser!)

The Archi Graphpad offers performance and accuracy comparable to other graphics tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely.

The software, which is in the form of a relocatable module (RM), intercepts the system calls which control the mouse, and so allows virtually all mouse based Archimedes software to be controlled using the tablet without any modification. The only exceptions are programs which use the serial port, as the tablet is physically connected to this post itself.

Graphics programs such as Artisan, Pro Artisan, AutoSketch, Oak DTP, and the RiscOS Draw, Paint and DTP packages are considerably enhanced by the use of the graphics tablet as opposed to the mouse, although it can, of course, be used with any other mouse driven application.

The software allows the user to define how much of the tablet's 12" x 12" working area to use, allowing very fine control when drawing freehand or tracing from a variety of differently sized drawings, diagrams, photographs, etc.

The tablet driver is compatible with all Archimedes machines, and with both Arthur and RiscOS operating systems.

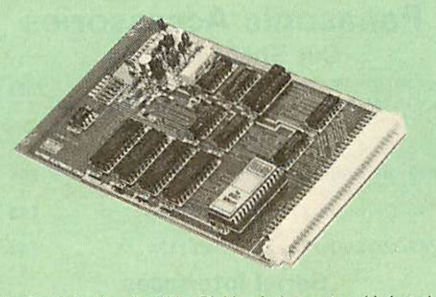
The pointer is moved via a four button puck complete with transparent lens and crosshairs for optimum accuracy. Three of the buttons emulate the Archimedes mouse buttons precisely, the fourth being used for special functions such as setting the position and size of the active working area. The buttons may be re-mapped to allow the relationship between tablet and mouse buttons to be redefined, should this be required.

The software is supplied with a special adaptor lead to connect the tablet to the Archimedes' serial port, and a power lead which plugs onto the Archimedes' main board.

Launch Price £259

(Price includes Tablet, leads and software)

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To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. For ease of access, the switches are front mounted. DP35-800S has its own power supply, independent of the BBC Micro.

Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

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FREE

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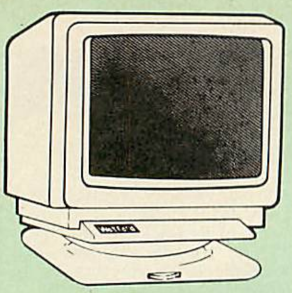
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- **TAXAN** Multiscan 870 16" Monitor **£499**
- **EIZO** 8060H – For technical info. read the review in Micro User, Jan. '89 **£429**
- **EIZO** 8060H Multiscan **£449**
- **EIZO** 9060S Super High resolution multiscan monitor for a wide range of applications. 800 dots x 600 lines. Display for high res VGA. 0.28 Dot pitch **£469**

TAXAN 12"

- Super Vision 3 – **Type 625** Super Hi-res RGB Colour, Green/Colour Switch **£269**
- KX117 – Hi-Res Green Screen Monitor **£79**

PHILIPS

- **BM7502** 12" Hi-res Green Monitor **£64**
- **CM8833** 14" Med. Res Colour Monitor **£195**

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £189

Dust Cover for Phillips Monitors **£6**

SPARE LEADS

BNC Lead for Zenith or Philips	**£3**
Skart Monitor Lead	**£5**
RGB lead for TAXAN Monitors	**£3**
Archimedes Colour Monitor Lead	**£7.50**

SWIVEL BASES

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the monitor viewing angle.

for 12" Monitors **£8** (carr. £2.50)
for 14" Monitors **£12** (carr. £2.50)

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

£12

PLOTTERS

- Plotmate A4S **£379**
- Plotmate A3M **£549**

Roland Plotters

(Official Roland Appointed Distributor)

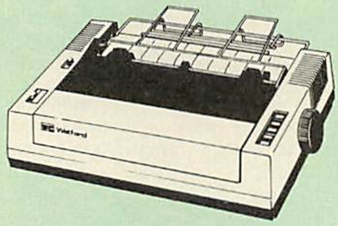
- **DXY 880A** **£560**
- **DXY 1100** **£630**
- **DXY 1200** **£879**
- **DXY 1300** **£1035**

TAXAN KP-815 PRINTER

Offer Price £149

Taxan KP915 132 Column	**£275**
RS232 Interface	**£49**
RS232 Interface with 2K Buffer	**£69**
RS232 Interface with 16K Buffer	**£89**

Panasonic KX-P1081



UK's most popular printer.

SUMMER SALE OFFER only: **£135**
Optional RS232 Interface: **£39**
(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Panasonic Printers

- **KX-P1124** 24pin 80col. 192/63 CPS **£259**
- **KX-P1180** 9pin 80col. 192/38 CPS **£155**
- **KX-P1540** 24pin 136col. 240/80 CPS **£435**
- **KX-P1592** 9pin 136col. 216/45 CPS **£275**
- **KX-P1595** 9pin 136col. 288/61 CPS **£355**

- **Panasonic KX-P4450** LASER PRINTER Latest technology at Watford's special offer price **£1,399**
- Spare Toner **£29**
- A4 Feeder **£55**
- Drum Unit **£149**
- Developer **£115**

RS-232 GENDER CHANGERS

Male to Female	**£4.95**
Male to Male	**£4.95**
Female to Female	**£4.95**
25 way Male to 9 way Female	**£4.90**

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32) **£175**; KX-P1540 (P35) **£185**
KX-P1124 (P36) **£88**; KX-P1180 (P37) **£79**

BUFFERS

P12 4K Buffer Board for 1081	**£55**
P42 32K Buffer Chip for 1592/1595	**£49**
P43 32K Buffer Chip for 1540/1124	**£49**

Serial Interfaces

P17 P1081/1592 **£32** P19 P1124/1180 **£55**

Original Panasonic Ribbons

Guaranteed to last 3 million characters
P110 for KX-P1081; 1592 & 1595 **£8**
P115 for KX-P1180 **£8** P145 for KX-P1124 **£8**
P140 for KX-P1540 **£10**

INTEGREX COLOUR JET

- Colour Jet 132 Printer **£515**
- Paper Roll **£6.50**
- Screen Dump Software **£10**
- Colour Cartridge **£16.50**
- Black Cartridge **£10.35**
- 100 A4 OHP transparencies **£55**
- 8K Serial Interface Optional **£123**

NEW – Intergrex COLOURCEL NPQ Ink Jet Colour Printer **£2,695**

NEC P2200 PINWRITER

24 pin; 80 column; 168CPS – 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc.

£269

Pinwriter Serial Interface (optional)	**£55**
P2200 Cut Sheet Feeder	**£59**
Additional Font Cartridge	**£25**

NEC PINWRITER P6/P7 Plus

NEC P6+ 80 columns **£439** NEC P7+ 136 columns **£575**
Colour Option **£74** Serial Interface **£73**
Cut Sheet Feeder **£125**
NEC Ribbons for P6 **£8**; P7 **£9.50**
NEC P2200 Pinwriter Ribbon **£6**

Star Printers

Star LC10	**£159**	NB24-10	**£425**
XB24-10 Colour	**£425**	LC10 Colour Ribbon	**£6**
LC10 Colour	**£215**	Cut Sheet Feeder	**£65**
Star LC24-10	**£279**		

EPSON PRINTERS

EX800	**£410**	LQ850	**£430**
EX1000	**£564**	LQ860	**£539**
FX850	**£315**	LQ1050	**£549**
FX1000	**£425**	LQ1060	**£679**
FX1050	**£439**	LQ2550	**£895**
FX1060	**£679**	LQ2500+	**£839**
LQ500	**£275**	LX800	**£149**
LQ550	**£275**	SQ2500	**£975**
GQ3500 Laser	**£1150**		

CUT SHEET FEEDERS for
EX800 **£149**; FX800/LQ800 **£149**; FX850/LQ850 **£149**; FX1000/LQ1000 **£179**; LQ500/LX800 **£79**; LQ1050 **£175**; LQ2550 **£390**.

TRACTOR FEED for
LQ800 **£44**; LQ850/FX850 **£69**; LQ1050/FX1050 **£85**; LQ2500 **£90**; LQ2550 **£90**

ACCESSORIES
- EX800/1000 Colour Option **£55**
- EX800/1000 Colour Ribbon **£18**
- LQ2500 Colour Option **£65**

(Securicor Carriage on Printers £7

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

RS232	**£32**	RS232 + 2K Buffer	**£52**
IEEE 488	**£40**	RS232 + 8K Buffer	**£79**

PRINTER LEADS

BBC Centronics 4' long	**£5**
BBC Centronics 6' extra long	**£7**
Compact's Special Centronics Lead	**£7**
Archimedes Printer Lead 1 meter	**£6**
Nimbus Centronics Lead	**£12**
IBM Parallel Lead 1 meter	**£6**
Double Ended 36 way Centronic Lead 4'	**£7**
Double Ended 36 way Centronics Lead 6'	**£9**
MSX Centronics Parallel Lead 4'	**£12**
RS232 Leads (Various)	**P.O.A.**

Listing Paper (Perforated)

- 1,000 Sheets 9½" × 11" Fanfold Paper £7
- 2,000 Sheets 9½" × 11" Fanfold Paper £12
- 1000 Sheets 9½" × 11" NCR 2 Part Fanfold £19
- 1,000 Sheets 15" × 11" Fanfold Paper £9
- 1000 Sheets true A4 Fanfold Paper 70gms £11
- 2000 Sheets true A4 Fanfold Paper 70gms £19
- Teleprinter Roll (Econo paper) £4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

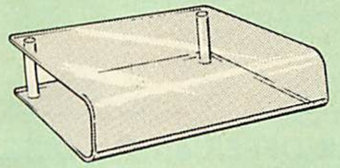
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 × 36mm (Single Row)	**£5.00**
1,000 90 × 36mm (Twin Row)	**£4.90**
1,000 90 × 49mm (Twin Row)	**£7.50**
1,000 102 × 36mm (Twin Row)	**£6.25**

Carriage on 1,000 Labels £1.00

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand. The printer sits on top and the fanfold paper rests neatly underneath, thus occupying the same space as the printer footprint.

80 Column version **£16** (carr £3)
136 Column version **£16** (carr £4)

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

***80 Column version £16** (carr. £3)*
***132 Column version £16** (carr. £4)*

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
Brother HR15/20	**£3.00**	–
BBC Micro	–	**£3.50**
BBC Master	–	**£4.00**
Archimedes Micro pair	–	**£9.00**
IBM PCs pair	–	**£6.00**
RX/FX80/MX80	**£3.00**	
DMP2000	**£3.75**	**£4.75**
EX/LQ800	**£4.50**	**£4.50**
EX/LQ1000	**£7.50**	**£5.00**
RX/FX80/85/800/MX80	**£3.90**	–
RX/FX100/1000	**£5.75**	–
Kaga/Taxan KP810/815	**£4.90**	**£5.00**
LC10 (Black)	**£4.25**	**£5.00**
LQ500/800	**£3.75**	**£5.00**
LQ1050/LQ2500	**£8.50**	**£5.50**
LX80/86/800	**£3.80**	**£4.50**
M1009/GLP	**£3.80**	**£3.75**
Panasonic KX1080/81	**£4.00**	**£4.75**
SQ2500	**£23.00**	**£5.50**
Star NL10	**£3.75**	**£4.50**
Olivetti Ink Jet Cartridges (set of 4)	**£9**	

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Universal Printer Sharers/Changers

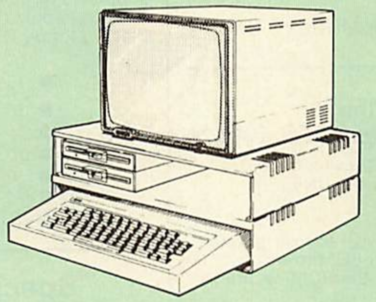
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spagetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments.)

Connects	**Serial**	**Centronics**
2 to 1	£20	£22
3 to 1	£27	£30
5 to 1	£36	£39

(Cables extra at £6 each. Please specify type required when ordering)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



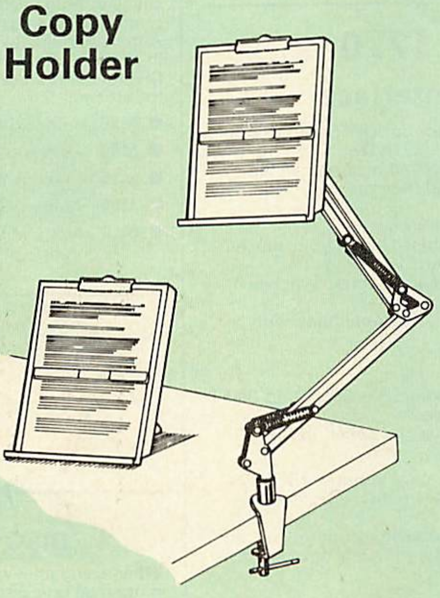
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	**£13**
Double BBC Plinth	420 x 310 x 210mm	**£24**
Printer Plinth	420 x 310 x 105mm	**£12**
Single Master Plinth	490 x 310 x 105mm	**£14**
Double Master Plinth	490 x 310 x 210mm	**£26**

(Carr. Single plinth £2; double plinth £3)

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

NEW

Handy 2 Way Printer Switch

A handy two way compact printer switch that enables you to connect 2 Micros to 1 printer, or 2 printers to 1 Micro. Attaches easily to your printer, monitor, etc. A low cost solution for educational establishments. Ideal for those wishing to use a dot matrix and a laser printer. Available in two configurations.

Compact AB Switch Centronics **£20**
Compact AB Switch RS232 **£19**
(Cables extra at £6 each)

MEGABUFFER 256



The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

Only £149 (carr £5)

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

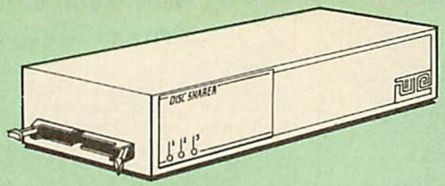
It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Continued →

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£65** — Price includes 3 Cables

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities then simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

WATFORD's & ACORN's DFSs

Watford's popular and widely acclaimed DFS has now been available for six years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn standard DFS). (while Acorn's 1770 DFS is fully compatible with Watford's Mk II DDFS)***

- *Watford's sophisticated DFS ROM only* — £16
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* — £12
- *DFS Manual (Comprehensive)* — *(no VAT)* £6.95

(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).

- *DNFS ROM only* **£17**
- *ADFS ROM only* **£25**

(The Single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

NEW

Watford's MkII 1770

Double Density DFS Interface

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features:

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00.**

- Special introductory offer — **£39.00**
- DDFS Manual — (No VAT) **£6.95**
  - We will exchange your existing DFS Kit for our sophisticated DDFS for only — **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.25** Twin CD (with PSU) **£3.90**

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

- *10 × 5.25" S/S D/D 40 Track Diskettes (744)* — ***£6.00***
- *10 × 5.25" D/S D/D 40 Track Diskettes (745)* — ***£7.00***
- *10 × 5.25" S/S D/D 80 Track Diskettes (746)* — ***£11.50***
- *10 × 5.25" D/S D/D 80 Track Diskettes (747)* — ***£11.00***
- *10 × 5.25" 1.6M D/S D/D High Density Discs for IBM XT and AT* — ***£16***
- *10 × 3.5" S/S D/D 40/80 track Discs* — ***£10.00***
- *10 × 3.5" D/S D/D 40/80 track Discs* — ***£11.75***
- *10 × 3.5" High Density Diskettes* — ***£25***

TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives, WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

- *10 ×* ***M3*** *3.5" D/S D/D 80 Track Discs* — ***£10***
- *10 ×* ***M9*** *3.5" Double Side High Density* — ***£25***
- *10 ×* ***M4*** *5.25" S/S D/D 40 Track Discs* — ***£5***
- *10 ×* ***M5*** *5.25" D/S D/D 40 Track Discs* — ***£7***
- *10 ×* ***M7*** *5.25" D/S D/D 80 Track Discs* — ***£9***
- *10 ×* ***M8*** *5.25" D/S H/D Hi-Density Discs* — ***£14***
- *3" Double Sided Discs* — ***£2.50*** *each*

Special BULK OFFER on 5¼" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
Without Sleeves	£35	£39	£45
With Sleeves	£38	£42	£48

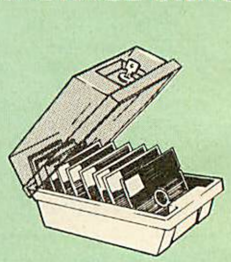
FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

£4

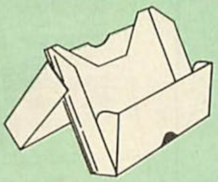
ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



- **M35** - holds upto 50 5¼" discs — **£4.95**
- **M85** – holds upto 95 5¼" discs — **£6.95**
- **M25*** – holds upto 25 3½" Discs — **£4.95**
- **M50** – holds 50 3½" Discs — **£6.50**
- **M10** – holds 8 of No. 10 Data Cartridges — **£15**

* Not lockable



PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

DISC PLONKER RACK



When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds upto eight 5¼" discs.

Protection at Only: **£2**

DISC ALBUMS

Attractively finished in black leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with an Utilities Disc.

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

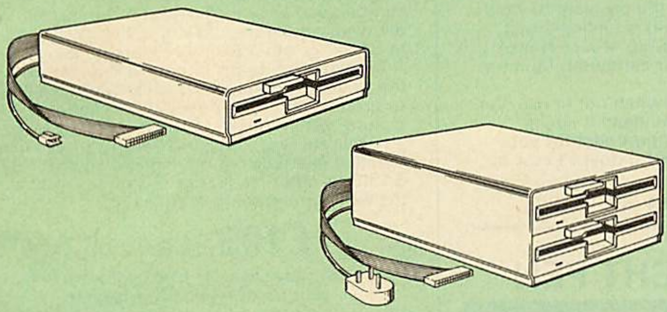
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £18. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 4th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415



"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £75	CLD 400 £168	CS 400S £85	CD400 £188
800K (1.44M)		CLD 800S £153		CD 800S £163

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £6 to £7

Prefix ***C** = Cased Drive* *Suffix* ***S** = 40-80 Switchable*
***L** = Less PSU*
***S** = Single*
***D** = Double*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

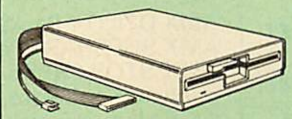
Mysteries of Disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

Special 40/80 Disc Drive/DDFS Mk II Offer



● The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
● Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both, Single & Double Density modes.
● A comprehensive User Friendly Manual.

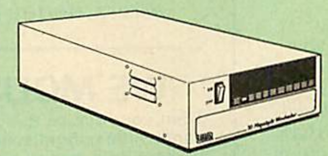
A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)

3½" DISC DRIVE OFFER



These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

● **CLS35 400K Unit £69** ● **CLD35 800K Unit £125**

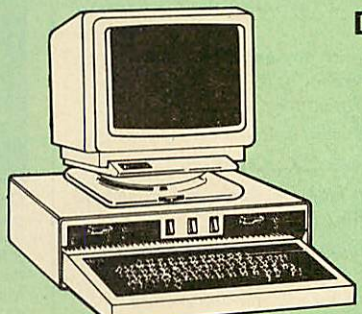


WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.
This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.
Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!
Compatible with the Master, and the BBc B (with 17 X disc interface).

● 30 Megabyte BBC Hard Disc **£405** (carr £9)

DP35-800S **DP35-800S**

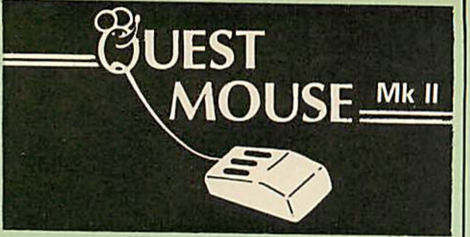


Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC & Master £182
DP35-800 for BBC/Master £165
(For DP35-800S spec. see Page 2 of our advert)
(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued



- Quest Mouse II & Quest Paint **£58**
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont **£89**
- Quest Mouse II only **£29**
- Quest Paint Software only **£34**
- Quest Font Disc **£15**
- Quest Mouse Mat (Red or Blue or Green please specify) **£3**
- Part Exchange your unreliable AMX Mouse for a Quest Mouse for only **£22**
- GXR ROM for the BBC Micro **£22**

(P.S. Quest Paint is not compatible with BBC Compact)

N.B.
1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.
Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

ConQuest ROM Package **£30**
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75

THE NEW Mk III AMX MOUSE

ONLY: £59 **Inc. Super Art package** (carr £3)
(Please specify for BBC, Master or Compact)

MOUSE MAT	**£3**
AMX MOUSE ONLY	**£29**
AMX UTILITY Package	**£13**
AMX SUPERART Package	**£34**
AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse	**£32**
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	**£13**
AMX DESIGN (ROM)	**£55**
AMX XAM Educational	**£15**
AMX EXTRA EXTRA	**£16**
AMX MAX A gem of desktop (ROM)	**£15**

NEW

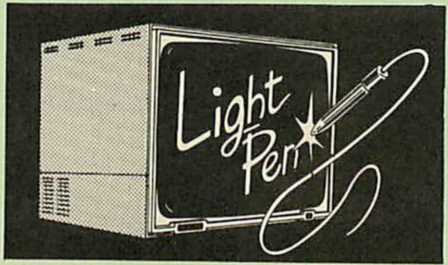
ARCHI Mk II MOUSE
An extremely reliable replacement mouse for Archimedes Micro **£39**

WE MOUSE HOUSE

Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, Monitor, disc drive or desk.
It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4

MARK II LIGHT PEN



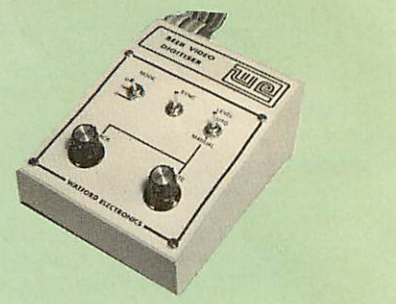
Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.

Price Only £21
(Price includes FREE software Disc and Operating Manual)

FLEET STREET EDITOR

Software pack for BBC Micro	**£33**
Software pack for the Master	**£39**
Software Pack for Compact	**£40**
Admin Xtra Disc Utility	**£13**
Walt Disney Disc Utility	**£13**
Fonts N Graphics Disc Utility	**£13**

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

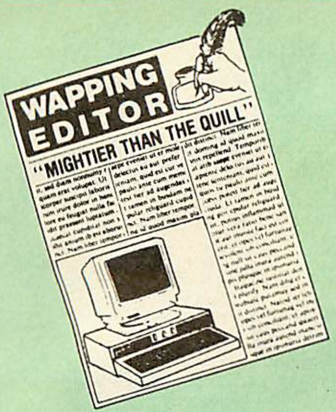
Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.
This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.
The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.
Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.
Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package i designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.
A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image. Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £5)
(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)
A combination of the Pagemaker and Watford's Beeb Video Digitiser.
Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.
They can then be used within Stop Press to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.
With Stop Press's many features, a variety of pictures can be composed – the only limit being the imagination.
Pictures can be doctored using Stop Press's graphics option to produce any number of effects.
Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.
Once created the picture can be printed out.
The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)



The WAPPING EDITOR

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantge of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

PAGE LAYOUT SECTION

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module is a mode 0 version of the highly acclaimed Quest Paint package, detailed elsewhere in our advert, and incorporates all the same drawing facilities, e.g. pencil, brush, airbrush, polygon, circle, ellipse, fill, cut-and-past, etc., etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

WORD-PROCESSOR

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

THE FONT EDITOR

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designedto take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.

Upgrading to the Wapping Editor could not be easier since the font editor will convert fonts from other packages, such as Quest Paint or Stop Press (formerly Pagemaker), into Wapping Editor format and a mode conversion utility will convert any screen in modes 1, 2, 4 or 5 into a full grey-scale mode 0 screen. Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser, either independantly or from within the Wapping Editor package.

For convenience all types of file may be stored on the same disc, with the software intelligently and transparently distinguishing between them. Filenames are picked off the screen with the mouse, despensing with keyboard entry wherever possible.

"The Wapping Editor combines sophistication with ease of use and power with simplicity, to make it the most comprehensive and user-friendly DTP system ever likely to be written for the Beeb".

Wapping Editor Software Pack **£69**
Wapping Editor plus Mouse **£89**

NEW

Wapping Font Disc

Sixteen Wapping Editor fonts including smaller versions of Oberon and Daisy and two new sizes of the standard font.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

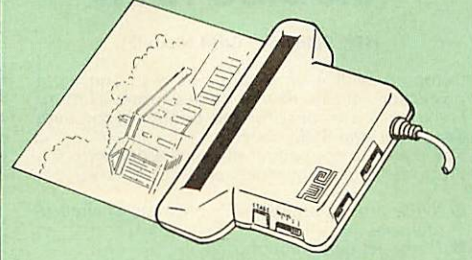
NEW

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games, etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.
Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.
There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.
A Mode 0 screen dump routine is also included.
To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routines you can archive large numbers of screens onto a single disc.

£15

The Beeb HandScan
Watford's Hand-held Scanner for the BBC Micro

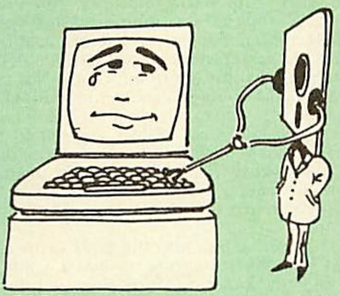


Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer for the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilitiesis provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various type of dithering may be selected to simulate the grey levels of a scanned picture. All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware **£135**

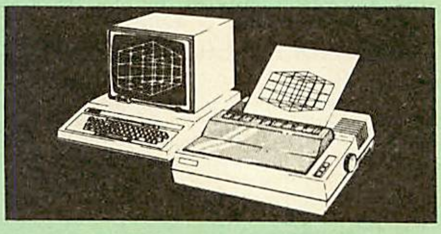
DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS432, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered and User Port triggered dumps

For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles.

Only: £25

Continued

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£69** (carr. £2)

Aries B-12 Sideways ROM Board

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price:	
Aries B-12	**£36**
Aries B-12C	**£5**

ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7
Deltabase B – Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128	£25
Delta-Cat A mouse eliminator Joystick for the Archimedes	£26

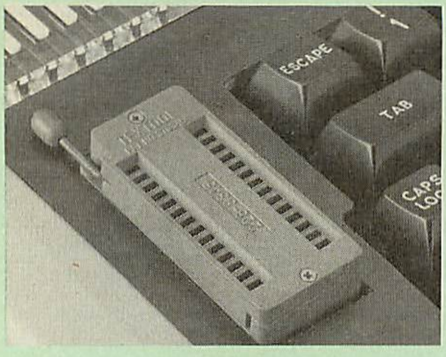
REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£15 (40 or 80 track)

Not compatible with 1770/DDFS.

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

ROM Cartridges for the BBC Master
Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc.
Twin **£8**; Quad **£12**

16K DISC RAM

(16K Sideways RAM Module)

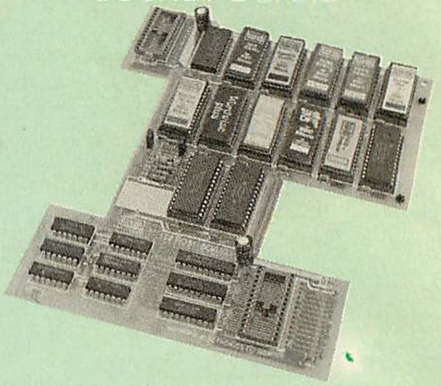
Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Compact construction.
- Supplied complete with Battery Backup.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£32** (carr £2)

P.S. 16K Disc Ram Board is not designed to work in conjunction with a Sideways ROM Board.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

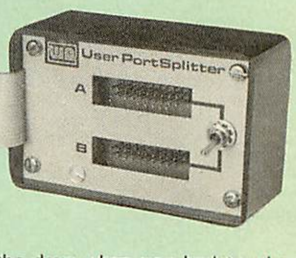
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery backup fitted **£39**
Battery Backup only **£3**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

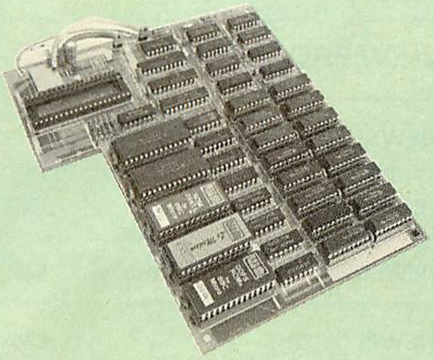
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£22** (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM ***£48***
- ROM/RAM card with 64k dynamic RAM ***£65***
- ROM/RAM card with a massive 128k dynamic RAM **£109**

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit **£17**
- 16k Dynamic RAM for Upgrade **£17.50**
- Battery backup **£3**
- Read and Write protect switches .... **£2 each**

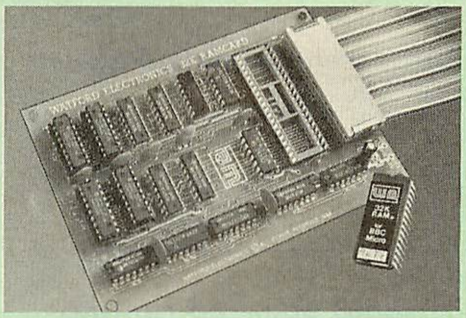
Complete ROM-RAM board
All options installed **£115**

P.S.
Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £2)
(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs **£11.25**
- Maths with a Story 2 (Disc) 4 further maths programs **£11.25**
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs **£17**
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- ELECTRONICS IN ACTION (Disc) O Level program **£19.95**
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. **£20**
- ECOLOGY (Disc) O Level program. **£20**
- POLYMERS (Disc) O Level program. **£20**
- Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20**
- FOOD & POPULATION (Disc) O Level program. **£20**
- MICROTECHNOLOGY (Cassette) O Level program. **£11.25**
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. **£21.70**
- DEUTSCH DIREKT! (Disc & Audio Cassette) **£19.95**
- Modem Master (Disc) **£11.25**
- ADVANCED TELETEXT SYSTEM **£8.65**
- PERIOD TABLE SOFTWARE **£20**
- Astronomy – Primary (Disc) **£12**
- Computers at Work – Primary **£17.35**
- Introducing Geography – Primary **£17**
- **Introducing Geography 11-17yrs** **£17.50**
- Electric Fields 6-14 years **£11.25**
- BlackQueen Contract Bridge **£13**
- Espana Viva – 3 Discs **£19.95**
- A Vous La France Disc **£21.50**

Educational Software

FUN SCHOOL 2 – Red: 6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump. **£11**

FUN SCHOOL 2 – Green: Over 8 yrs – Eight programs on Disc. Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. **£11.25**

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Versatile **BEEB SPEECH SYNTHESISER** Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£30
CARETAKER Basic Utility	£23
DISC DOCTOR	£28
Graphics ROM	£29
TERMI	£25
COMMUNICATOR	£49
Printmaster	£24

Wordwise £26

Wordwise plus £40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £42

Inter SHEET ONLY £37

INTER CHART ONLY: £25

Inter-WORD £36

MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM **£76**

INTERBASE £49

All Prices Exclusive of VAT

MINI OFFICE II

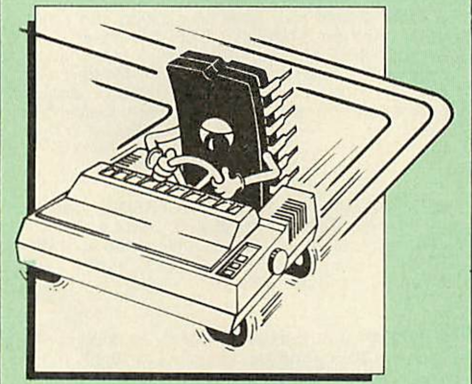
DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.50
Disc Version for the Compact	£18.00

(When ordering please specify for which Micro & 40 or 80 track Disc).

Advanced Computer Products

Advanced Disc Toolkit	£30
Advanced Disc Investigator	£25
Advanced 1770 DFS BBC	£29
Advanced 1770 DFS Master	£30
Advanced File Manager	£25.00
Advanced Control Panel	£30.00

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

VIEW WORDPROCESSOR 2.1	**£35**
VIEW 3.0 ROM	**£48**
VIEW PROFESSIONAL	**£59**
VIEWSHEET (Acornsoft)	**£36**
VIEWSTORE	**£36**
VIEWSPELL with 80 track disc	**£29**
VIEWPLOT Disc (Please specify for Master 128 or Compact)	**£20**
VIEW-INDEX	**£12**
OVERVIEW Packs 1 & 2	**£69**

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

OFFICE MASTER



CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features.

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£5.95
15 Hr Wordprocessing BBC/WW & WW+	£5.95
30 Hour BASIC (BBC Micro)	£12.95
6502 Assembly Language Programming	£19.95
6502 Application	£13.95
6502 Development Package	£7.50
6502 Programming the	£16.95
6502 Reference Guide	£10.95
68000 Assembly Language	£15.95
68000 Assembly Language Prog.	£19.95
68000 Assembly Language Techniques	£24.95
68000 Machine Code Programming	£13.00
68000 Microprocessor Handbook	£14.95
68000 Programming the	£22.95
68000 User Guide	£8.95
6809, Programming the	£18.95
Advanced User Guide for BBC	£10.95
Amiga Hardware Ref Manual	£23.70
Amiga Machine Lang. Guide	£19.95
Art of Microcomputer Graphics	£16.95
Assembly Language Prog. for the BBC	£10.95
Assembly Language Quick Ref.	£21.95
AY-3-8910 Programmable Sound Generator Data Manual	£3
BASIC 2 – User Guide	£2
BBC – Advanced Graphics with the	£11.75
BBC – Advanced Programming Techniques for	£8.95
BBC Basic Guide	£19.95
BBC Computer Handbook – The Complete	£14.95
BBC – Mastering Assembly Code	£8.95
BBC Micro & the small Business	£5.75
BBC Micro – File Handling On	£8.50
BBC Micro – within the	£13.95
BCPL User Guide	£14
BCPL The Language & its Compiler	£8.50
C Big Red Book of	£7.50
C - A Dabhand Guide to	£14.95
C for Programmers	£9.95
C Programming Lang. 2nd Edition	£24.95
COMAL – Introduction to	£9.50
Complete FORTH	£6.95
Computer Graphics & CAD fundamentals	£9.95
Deutsch Direkti (Book only)	£5.95
DNFS Instruction Booklet	£2
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
File Handling on BBC Micro	£8.50
FORTH – Advanced	£9.95
FORTH on the BBC Micro	£9.95
Hackers Handbook - New	£6.95
Hitch-Hikers Guide to A.I.	£8.95
Introduction to COMAL	£9.50
Inside Information, Computers & Coms.	£9.95
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Logo on the BBC Micro	£7.50
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering Assembly Code	£8.95
Mastering Interpreters & Compilers	£14.95
Mastering Music	£6.95
Mastering the Disc Drive	£7.95
Master 512 Guide – Dabs	£9.95
Master Operating System	£12.95
Master Reference Manual Part 1	£14.00
Master Reference Manual Part 2	£14.00
Master Reference Manual – Advanced	£19
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PASCAL – Introduction to	£17.95
PASCAL Programming	£9.45
Practical Disc File Techniques	£5.95
The Epson FX-KAGA PRINTER Commands REVEALED	**£5.95**
The Software Business	£5.50
Towers Int. Transistor Selectors	£14.95
Understanding Interword – A Beginners Guide	£6.50
Using DOS+ on the 1512 (95% Ok for 512 Bd)	£9.95
View 3.0 User Guide	£10
View Guide (View 2.1)	£4.50
Viewsheet & Viewstore Dabhand Guide	£12.95
Mastering View, Viewsheet & Viewstore	£12.95
VIEW Dabhand Guide	£12.95
Viewsheet User Guide	£10
Viewstore User Guide	£10
Writing Interactive Interpreters & Compilers	£8.45
Wordwise + A User Guide	£9.95
Z88 Computing	£9.95
Z88 Using Your	£9.95

Carriage on Books vary between £1 to £3.50, depending on their weight.

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1-2-3 For Business 2nd Edition	£20.95
1-2-3 Command Language	£19.95
1-2-3 Special Edition (QUE) – Using	£21.95
8086/8088 Assembly Language Prog.	£12.45
8086/8088 Programming the	£17.95
Ability – Using	£12.95
Accountancy software in Business – Using	£12.95
Advance C Tech & Application	£19.95
Advanced Tech. in Turbo Pascal	£19.95
Aldus Pagemaker – Using	£21.45
Amstrad Basic 2 Manuals	£12.95
Amstrad Technical Manual for 1640	£19.95
Amstrad PC Programmers Ref Guide	£7.50
Amstrad PC1512-1640 Step by Step – Using	£8.50
Amstrad PC 1512/1640 – Using 2nd Ed.	£9.95
Amstrad PC 1512 PC User Guide – 2nd Ed	£9.95
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dBase II & III – Understanding	£7.95
dBase II – Working with	£9.95
dBase III – Mastering	£21.95
dBase III Plus	£12.95
dBase III Plus – Complete Reference	£19.95
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dBase III Plus – Quick Prog. Guide	£8.95
dBase Instant Reference (III & III+)	£10.95
dBase IV – Handbook £19.95	
dBase 4 – Understanding	£22.95
DOS Instant Reference (up to 3.3)	£10.95
DOS, Mastering for Versions up to 3.3	£19.95
DOS Power Tools (includes a disk)	£39.95
DOS Plus Manual/Amstrad PC	£10.95
DOS – Programmers Ref. Manual	£22.95
Excel IBM Version – Using the	£22.95
Good Software Guide – for IBM PCs and Compatibles	£19.95
Hard Disc Instant Reference	£10.95
Hard Disk Manage IBM PC XT AT	£17.35
Hard Disc – Managing your 2nd Ed.	£20.95
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IBM PS/2 Handbook	£19.95
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MS-DOS Commands – Quick Reference Guide	£4.95
MS-DOS – Running 4th edition	£21.95
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Xerox Ventura Publishing – Inside	£18.45

The Advanced Reference Manual for the BBC Master

At last Acorn's long awaited Advance Reference Manual for the BBC Master Series of Microcomputers has now been published. Watford Electronics' own authors have edited and added missing sections to the original script and produced a very high quality publication.

It features information about:

- Memory Organisation
- Slow data bus
- Detailed circuit description
- Keyboard controller
- Screen display
- User port
- Serial Processor
- Peripheral bus controller
- 1 Mhz Bus
- Machine operating System
- Second processors – Internal, Z80 and 80186
- Disc Filing Systems
- ANFS
- Terminal Emulator & Editor
- View internal format
- Detailed differences between Model B, B+, Master 128K and Compact
- Comprehensive appendix on 65C12 instruction set

At the rear of the manual there are pull out circuit diagrams for the Master 128K.
A worth-while addition to any Master owner's library.

All this for just £17 (NO VAT)

NEW

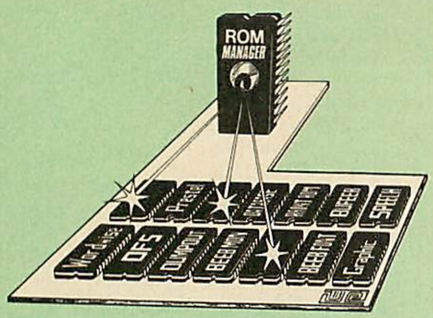
The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.
It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)
Example programs on Disc £4.95

Continued →

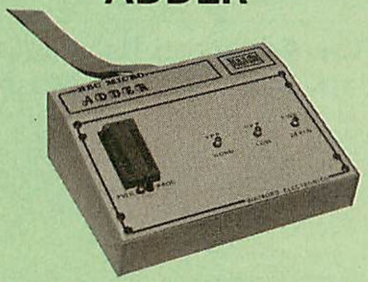
ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

£65 (£5 Carr)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
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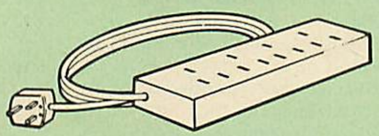
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LIE OF THE LAND

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David Lawrence

Kin shrugged. 'There'll be others. Don't look so worried. You wouldn't be human if you didn't yield to temptation. If you feel bad, ask Joel Chenge about the boots he tried to lay down in a coal stream. They didn't ruin his career.'

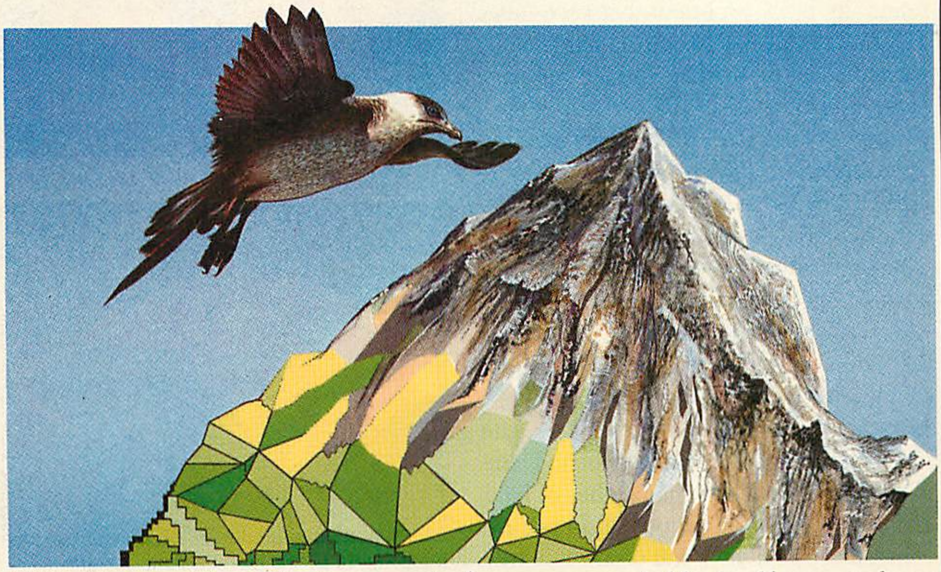
'And what did you do, Mizz?'

'Hmm?' The boy was looking at her sidelong.

'You sort of give the impression 'I've done something everyone else has done.' Did you do it too?'

Kin drummed her fingers on the desk. 'Built a mountain range in the shape of my initials.' she said.

From *Strata* by Terry Pratchett



In the July issue of *BBC Acorn User*, Andrew Rankin showed us how colliding galaxies can produce well-recognised patterns of stars. This article brings the subject of creation literally back down to earth, and graphically illustrates some of the forces that shape our landscape.

In essence, there are four natural processes that sculpt the landscape:

- Sedimentation – laying down of layers (or 'strata') of rock.
- Folding – squashing and bending of existing rock strata.
- Faulting – sudden shifts that cause the stata to shear and break.
- Erosion – removal of material by the wind, rivers or glaciers.

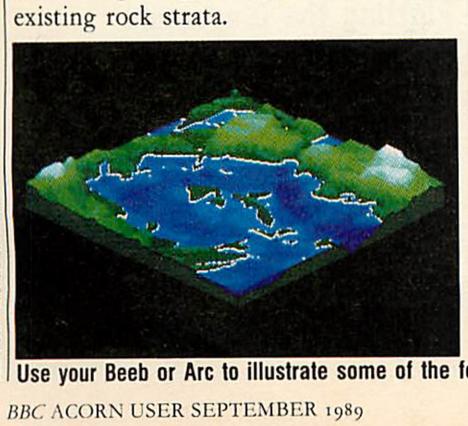
To simplify matters, these programs use only sedimentation and random faulting. This tends to produce dramatic, mountainous landscapes. Low, undulating hills could be modelled by replacing the routines by folding ones.

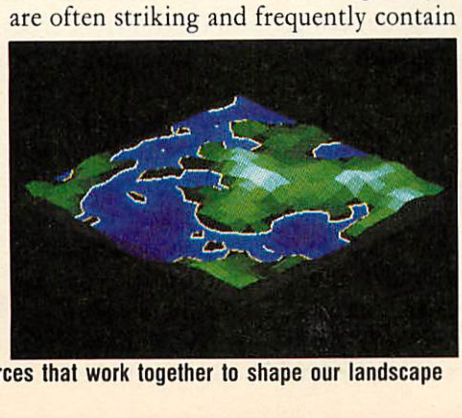
To add more realism to the scenes generated, the land is flooded with water and beaches added. The resulting images are often striking and frequently contain many recognisable landforms such as: mountain ranges and ridges, islands, bays, lakes, archipelagos and peninsulas.

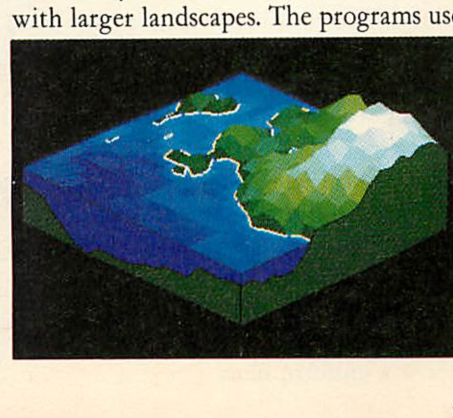
Running the program

There are two versions of the program in the yellow pages. Listing 1 is the original 32K version that runs on anything from an Electron to an A440 but due to memory constraints is a little bland.

Listing 2 is a specially enhanced version only for the Archimedes. This uses many more colours and can deal with larger landscapes. The programs use







Use your Beeb or Arc to illustrate some of the forces that work together to shape our landscape

ILLUSTRATION BY RICHARD DRAPER

identical algorithms for generating and plotting the landscapes but the Arc version is slightly more 'polished' due to the added structures available in Basic 5.

The programs are complete as they stand and contain sensible defaults for the various parameters. You can therefore simply type them in and run them immediately.

During the first stage of the program (the faulting), a counter is displayed at the top of the screen to indicate how fast the program is progressing. After this, the screen is blanked and a 3-dimensional view of the landscape is generated.

When you have run the program a few times, you may like to have a fiddle with the various parameters, these can be found in both programs between lines 140 and 210 in DEF PROCinit. These eight variables can be further divided into five separate groups.

- size% – the size of the array used to store the landscape. The value of size% is limited by the available memory. On a standard BBC, it can hardly be above 10, whereas values of 80 or greater are possible on the Archimedes.

When changing the value of size%, the values of the next three parameters should also be considered.

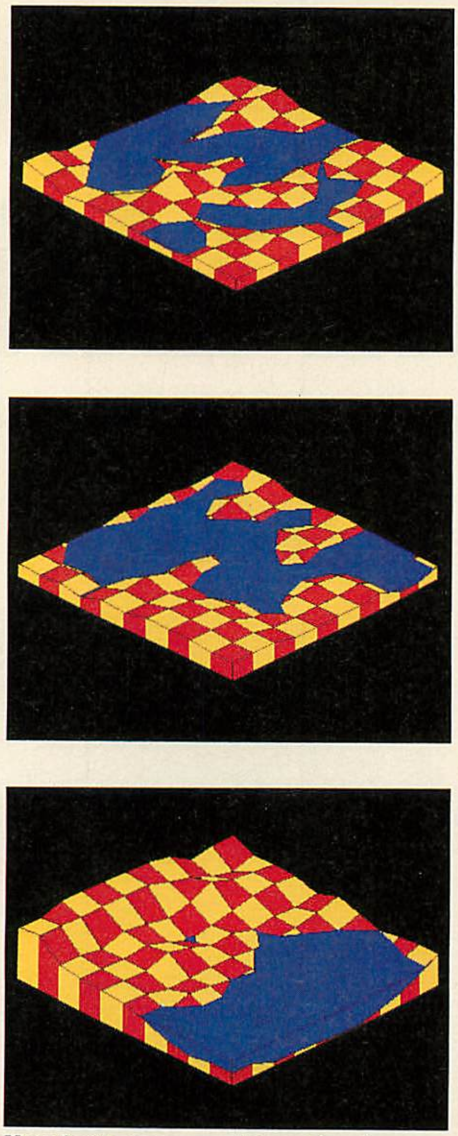
- xscale%, yscale%, zscale% – the scaling factors used when plotting the landscape. The size of the patches of land and sea which make up the landscape are controlled by xscale% and yscale%, while zscale% can be used to exaggerate the height of the land.

Some suggested combinations of these are given in table 1.

- circular, linear – are flags which indicate which of the two types of faulting will be performed. This is dealt with later.
- faults – the number of times the landscape is faulted.
- delta – controls the maximum amount of shearing that can occur in one fault. Again, this is dealt with below.

It is also possible to change the level of the water. As trhis is usually set to the average height of the land after faulting, it cannot explicitly be set at the start of the program. However, this will be discussed in detail later on.

Finally, for Archimedes users only, it is possible to change the screen mode the program runs in. In 16 colour modes such as 9 and 12, a fairly limited range of green are used to plot the land and the sea is a uniform blue.



More faults mean mountainous terrain

In 256 colour modes such as 13 and 15, 23 shades of green and 12 shades of blue are used. The program will also correctly function with a multisync monitor in mode 20 and with Risc OS mode 21, with 16 and 256 colours respectively.

Generating the landscape

As mentioned above, the program models sedimentation and faulting. To tell the truth, it really only models sedimentation once but can perform two different types of faulting!

The landscape is stored in a two-dimensional array called 'land'. The elements of this array are used to store the height of the land. Obviously if the array is larger, a greater area of land is stored and so the faulting is proportionally slower, unfortunately this is particularly noticeable on the 8-bit machines.

To start with, a single, uniformly flat and level layer of 'rock' is deposited over the landscape. This is achieved for free as the 'land' array is initialised to zero. The landscape is then faulted a number of times, the more faults, the more jagged and mountainous the final scene. The nature of the faults is controlled by three parameters described above.

Linear faults are generated if the 'linear' flag is set to TRUE. If this is the case, PROCline is called to create the fault. This then randomly picks two (unique) sides of the 'land' array and a random point along each side. These are converted into actual x,y co-ordinates and the coefficients of the equation of the connecting line is calculated – the M and C in $y=Mx+c$.

The array is then traversed point by point, and any co-ordinate found 'below' this line (if $Mx+c-y<0$ is raised or lowered by a random amount but fixed for each fault).

This 'constant' is calculated from the global parameter 'delta' multiplied by a random (non-integer) between -1 and 1. Figure 1 shows the idea.

Circular faults are generated if the 'circular' flag is set to TRUE. It is perfectly possible to have both types of fault active at one time.

Circular faults are generated in a similar way to linear faults except a circle is used instead of a line. A random centre and radius is chosen and any land within the resulting circle is raised or lowered as before. See figure 2.

After the requisite number of faults have been performed, PROClevels is called. This calculates the lowest, highest and average height of the land. These values are then used to set the green and blue scale for the land and sea colouring on the Archimedes version and the water level on both versions.

Usually this is explicity set to be the average height, but if you wish you may safely set it to any value between 'base' and 'peak'.

Plotting the landscape

For simplicity and speed, an isometric projection is used. There is no perspective nor complex hidden surface removal algorithms to deal with. The scene is plotted from the back forwards so the foreground overwrites the background.

The plotting algorithm deals with each 'patch' of landscape separately. The procedure PROCpatch(x,y) plots the square patch of land between (x,y) and (x+1,ys+1). As each patch has four

corners, there are 16 possible combinations of these corners being above or below water. See figure 3.

In each of these cases, the sea is drawn first and then land-coloured triangles are added according to which points are above the water. The 16 cases each have their own (null) function which is generated and called in DEF PROCsquare.

These procedures are provided to do the actual plotting:

PROC3d(k,x,y,z) – plots in style k to 3D co-ordinate (x,y,z)

PROC3dd(k,x,y) – plots in style k to 3D co-ordinate (x,y,land(x,y))

PROC3dm(k,s) – plots in style k to 3D co-ordinate of the intersection of land and sea on side s of patch x%,y%

The Archimedes version colours the land according to height and the sea according to depth. It also adds yellow lines along the land/sea boundaries to mark beaches. The BBC version uses alternate red and yellow squares for the land and has a uniform blue for the sea. At the edges of the array, various land and sea coloured triangles are added by PROCedge and PROCside to complete the scene.

Saving scenes

No method for saving the resulting images has been built in but any of the following methods would be fine:

- Save the screen memory
- Screen dump to printer
- Save the 'land' array in a datafile
- Fix the random number generator beforehand with:

dummy=RND (−n)

and keep a record of interesting 'n's.

Suggested alterations

Archimedes users could try changing the colouring – random dark shades of green, brown and red produce a pleasant farmland scene. You can also try different faulting algorithms, either adding a random factor to the radius of the circles for each point or even using a completely different shape such as a rectangle.

If you have enough memory or access to a hard disc try setting up an animation sequence either of the same landscape with different water levels, or the same landscape with progressively more and more faults. Both of these are possible in realtime on an Archimedes with two screens and a grid size of about 10!

Try adding trees, roads or houses to give the scenes a less abstract look or you could even try 'fixing' the array to build a mountain range in the shape of your initials ...

Lastly, the silliest suggestion (from a member of the *BAU* team) was for a short procedure to add a 'blot' on the landscape.

Well, we may have a long wait before we can start building and terraforming planets like the ones mentioned by Mr Pratchett but until then, I'm sure you can have fun pretending!

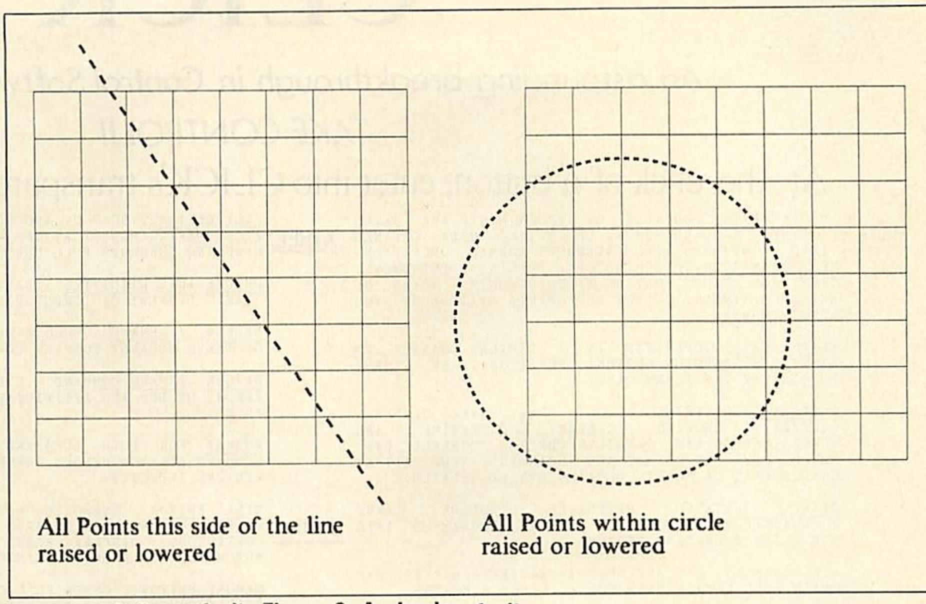


Figure 1. A linear fault, Figure 2. A circular fault

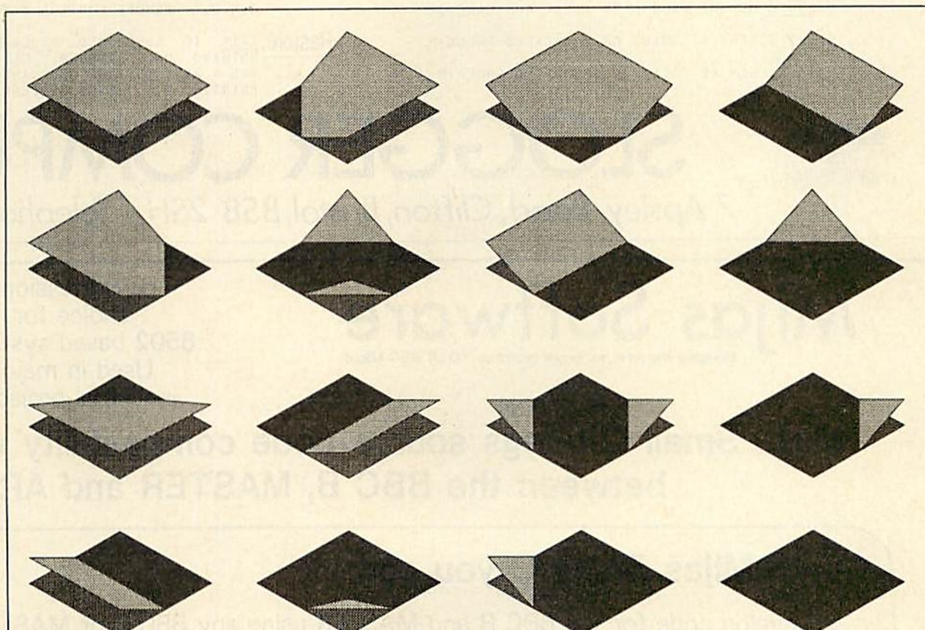


Figure 3. The 16 possible land/sea patches

size%	xscale%	yscale%	zscale%	
160	4	2	4 or 8	– Multisync only
80	8	4	"	– Default Arc values
40	16	8	"	
20	32	16	"	
10	64	32	"	

Possible variables. BBC owners with shadow Ram or Tube will be able to use larger values of size %, but to keep the isometric projection looking 'correct', make sure yscale % is half of xscale %

THE LATEST CONCEPT

A look at how the Apec card can contribute to using your software with the Concept Keyboard

Alex van Someren

This month we'll finish off the user port interface project built last month with an Archimedes interface for a Concept Keyboard of the kind used in many schools. In previous months we have looked at the constructional side of interfacing to the Archimedes and this month it's the turn of the software.

It's a fairly technical look but the example programs can be used directly, so skip to the section about trying out the software if you don't want to know the gory details.

A useful way to use a non-standard keyboard is to make it appear to application programs as if it were a perfectly ordinary Archimedes keyboard. To do this you must replace that part of the operating system which collects keypresses with your own routine that fetches them from the Concept Keyboard.

Patching the operating system in this way requires assembly language programming and Basic 5 has a built-in assembler for just this sort of application.

To make the software easier both to write and to understand, the listings which accompany the article require the use of the Risc OS operating system. Although some of you may not have been able to get your hands on a copy yet, Risc OS has so many advantages that it's worth the wait. You can get the components bought and the hardware built while you're waiting for your Roms to turn up.

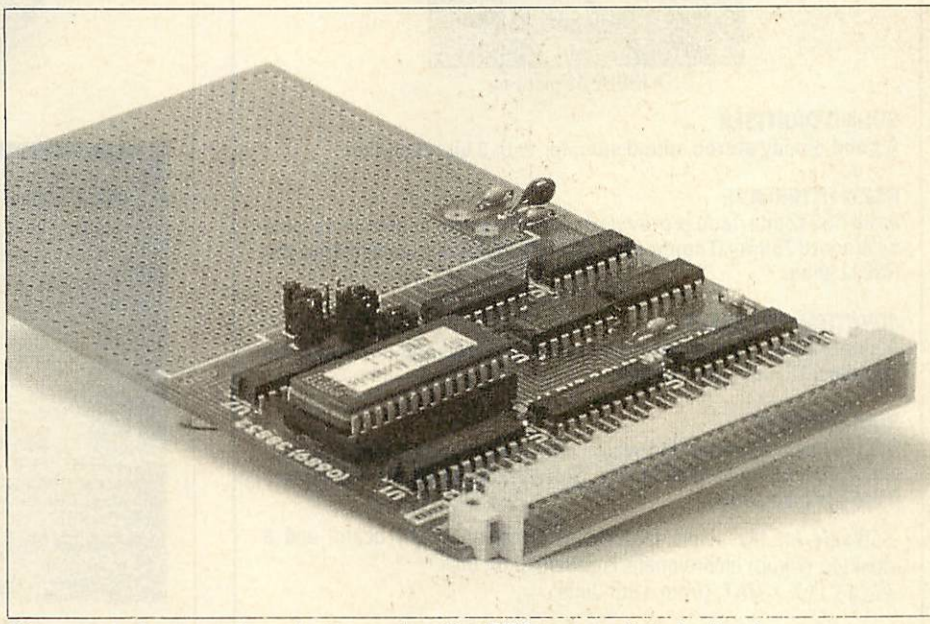
The software which drives the Concept Keyboard is loaded as a 'module'. Once you have entered listing 1 from this month's yellow pages, run the program to save the assembled module. It is given the filename 'CKMod' and saved in your current directory.

After saving the program, the finished module needs to be loaded by entering: `*RMLoad CKMod`, when the module will respond to two new star commands – `ConceptOn` and `*ConceptOff`.

These commands enable and disable the keyboard respectively, searching for suitable hardware plugged into a backplane as they go.

If error messages appear, check that you have sufficient space configured in the RMA and that the hardware responds to `*Podules`.

To help you understand the software, let's just have another quick look at the memory addresses used by expansion cards. Synchronous podule access is used



The empty Apec card ready to receive the BBC user point electronics

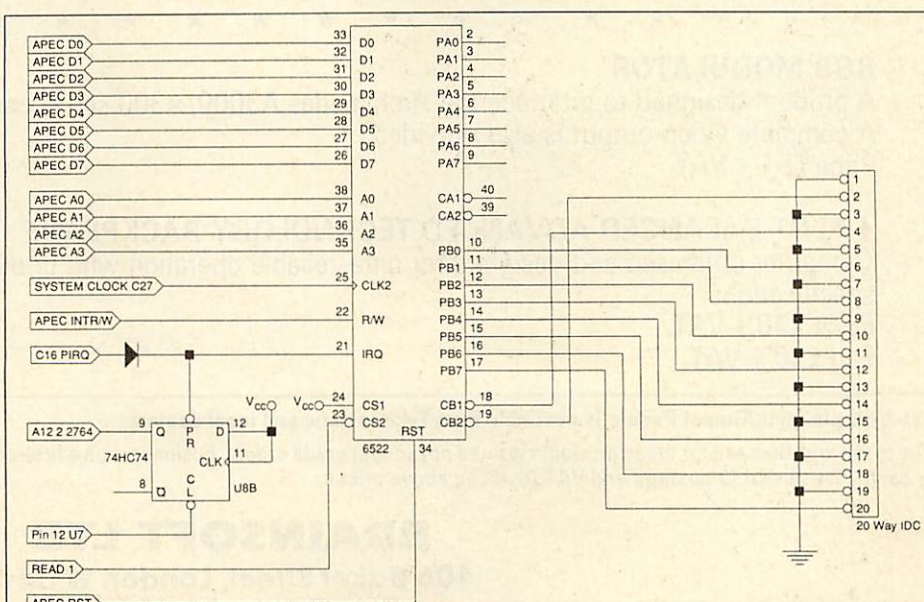


Table 1. The correct circuit of the user port. Last month's was wrong

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A MODE 12 picture

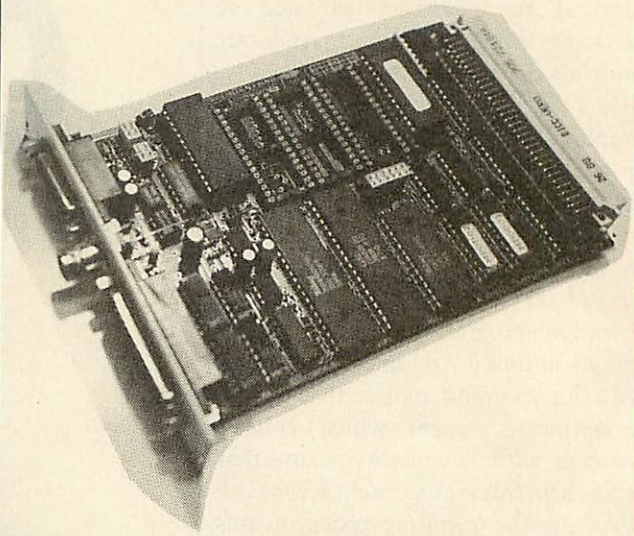
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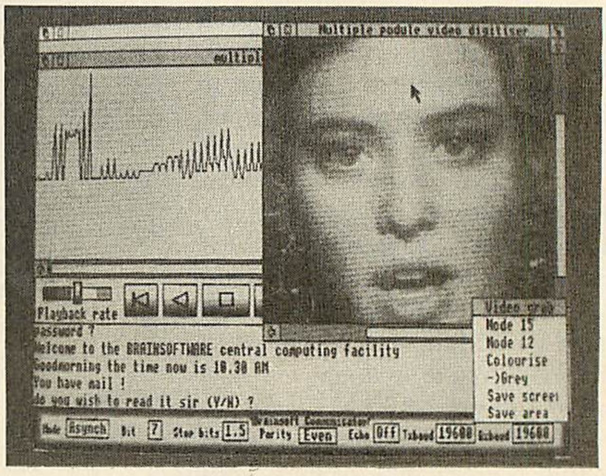
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so the base memory address of the podule, (variable name 'base') is given by the formula:

base=&33C0000+(&40000*socket).

Table 1 summarises the major addresses used to drive the User Port card.

The *ConceptOn command enables the 6522 card you've already built so it produces interrupts whenever a key is pressed. The module has its own keyboard buffer. OS_ReadC (used by Basic's GET) is replaced by a new routine.

This new routine takes characters from the new buffer as you would expect it to do. *ConceptOff sets everything back to normal, which being careful to ensure the card generates no further interrupts (otherwise the machine would crash as there would be no interrupt handler to deal with them).

The module header follows the standard form. The initialisation routine (.initmod) claims 256 bytes of workspace. The first 245 are used as the input buffer, the rest as flags and addresses.

These are specified as offsets within the workspace at the very start of listing 1. One of them, 'activeflag' contains 0 or 1 depending on whether the Concept Keyboard is being used or not. This is set to 0 in .initmod. The finalisation routine (.quitmod) switches the Concept Keyboard off (just in case) and then releases the workspace.

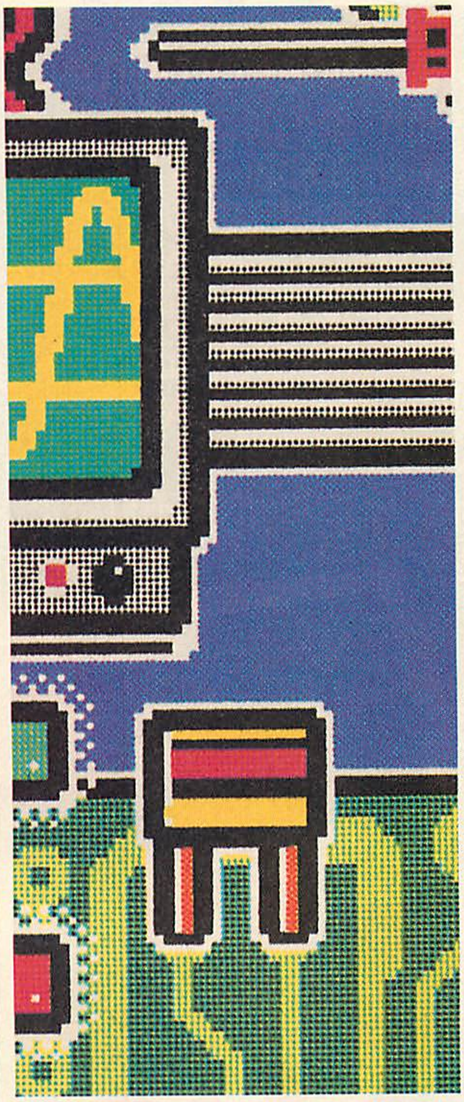
Thus, *RMclear and so forth will work fine even if the Concept Keyboard is active at the time.

The service call handler (.service) checks for two particular service calls. &27 is the reset call and upon this 'activeflag' is set to zero. &45 occurs just before a reset and the Concept Keyboard is disabled if it happens to be active upon receipt of this call.

*ConceptOn starts in the listing with the label .concepton and works in the following order:

First 'activeflag' is checked. If it is already set, the command is ignored. The start command tail is now checked for the optional parameter. If a podule number was specified, this is used.

If no podule was specified, each is checked in turn for suitability. First, product and manufacturer codes are examined to see if the card is an Apec. If so, location &2810 of the podule is read before and after a small delay. If the contents change, it is assumed to be a 6522 counter and the podule is selected.



Two addresses are stored in the workspace ('podulebase' and 'userbase' – the base of the podule and the base+&2000). This saves some instructions later on in the software.

The input buffer is cleared. Two pointers are used for the buffer, one pointing to the 'next character to write' and the other to the 'next character to read'. This technique is commonly known as a ring buffer.

The routine OS_ClaimDeviceHandler is called to notify the OS that you're ready for some interrupts. This call is new to Risc OS and takes five parameters. R0 contains the device type (13=expansion card). R1 contains the address of your handler. R2 contains the value you want passed to your handler in R12 (which will be the address of your workspace since the handler will need to place a character in the buffer).

R3 contains the address of the 'interrupt has happened' flag and R4 contains a mask for the byte containing this flag. Thus, any particular bit of any byte may be used. The OS does all the checking and only calls the relevant routine.

The new handler (at '.handler') simply reads the contents of the data register and attempts to put them in the buffer. The top bit of the page register is toggled to reset the system.

OS_ReadC is redirected to your routine. It is this operation which the rest of the software is here to assist. '.newreadc' is the version of the GET routine and simply takes characters from the buffer, or waits for one if the buffer is empty. Note the check for ESCAPE.

*ConceptOff begins in the listing with the label '.conceptoff' and fairly precisely reverses the procedure. The operating system calls OS_Release and OS_ReleaseDeviceVector take the same parameters as their enabling counterparts.

The final part of '.conceptoff' toggles the top bit of the page register and does a dummy read. This happens to ensure that the Concept Keyboard does not generate interrupts again. Finally the 'activeflag' is set to zero.

Trying out the keyboard

The second listing in the yellow pages is a short program which demonstrates the software. It first loads the module 'CKMod' and then displays a grid of numbers on the screen which correspond to the keys on the keyboard.

When you press a key the appropriate number lights up on the screen – hey presto!

To convert software you already have so it will work with the Concept Keyboard, start by making an overlay for the keyboard by drawing on a piece of paper. When you place the paper over the keyboard you can identify the key underneath each active part of the overlay by number and use these numbers in place of those in program lines such as:

```
X=GET:IF X=key number
THEN...
```

It is a few minutes work to convert many common programs in this way. Use the Basic command LIST IF GET to help you find relevant parts of the program.

The Archimedes Prototyping Expansion Card (Apec) is available for £25 for the bare printed circuit board with a pre-programmed Eprom and £35 for the ready-built version with Eprom. Both prices are exclusive of both VAT and postage. The Apec is available from Atomwide, 23 The Greenway, Orpington, Kent. Tel: (0689) 38852.

BACK TO THE WALL

BBC micro owners get a shot at redecorating with a version of last month's Arc wallpaper program

Colin Attenborough

Last month's *Wallpaper* program for the Archimedes showed just what aesthetic wonders are possible with a mathematically generated pattern.

BBC micro users, amazed at the results of that program will be equally amazed to know it can now easily be run on a model B or Master.

Unfortunately the program is too long to allow a mode 1 screen (the mode required) in a BBC micro with PAGE set at &1900 (the normal setting with a disc drive interface).

So the program includes a routine at the end to relocate the entire program down in memory to &E00 and to reset PAGE to &E00.

Since this is a largely irreversible process, you should save a copy of the program before running it. Master owners can ignore this.

Once run, like the Archimedes version, *BBC Wallpaper* requires three numbers to be entered. A first pattern is generated from these and the program will then cycle through six possible palette changes at the touch of a key before requesting a further three input parameters.

If you want to repeat any or all of the input parameters (shown in brackets below the prompts) then just press just RETURN.

Technical bits

From the three entered parameters, X, Y and S, the program calculates $(X+J\%*(S/256))^2$ and $(Y+J\%*(S/256))^2$ for values of J% from zero to 255.

Each pixel is coloured according to the MOD 4 of the sum of these squares. Calculating 512 squares is slow in Basic and difficult in 6502 code, so an indirect method must be used. If XS (J%) denotes $(X+J\%*(S/256))^2$, and s denotes S/256, simple algebra shows:

$$XS\ (J\%+1)=XS\ (J\%)+(s\hat{\ }2+2*X*s)+J\%*2*s^2.$$

This leads to an algorithm (in Basic terms):

```
 10 XSQ=X*X:phi=s^2+2*X*s:vi=0:
delta=2*s^2
 20 FOR J%=0 TO 255
 30 X2(J%)=XSQ:REM store squares
 40 XSQ=XSQ+phi+vi
 50 vi=vi+delta
 60 NEXT J%
```

Line 10 is carried out once in Basic, the rest in machine code.

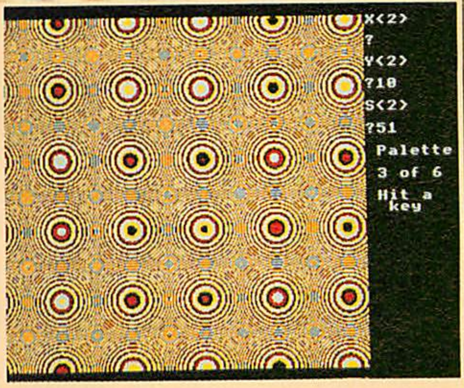
In order to save memory, each square is stored as two bytes, discarding bits with a weight greater than four. (The MOD 4 process would discard them later, anyway.)

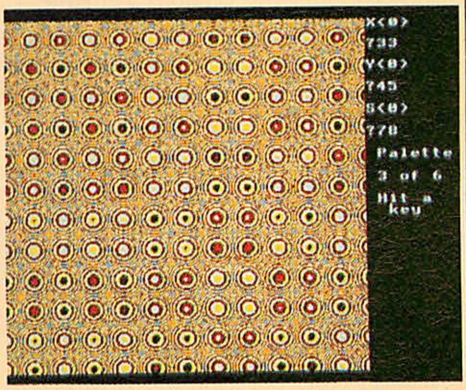
In the display section, poking directly to the screen is used for speed. However, getting the pixel colours you want by direct poking to a mode 1 screen can become quite complicated. The screen bytes are in a complex sequence, and the relationship between pixel colours and what to poke to the screen byte is convoluted.

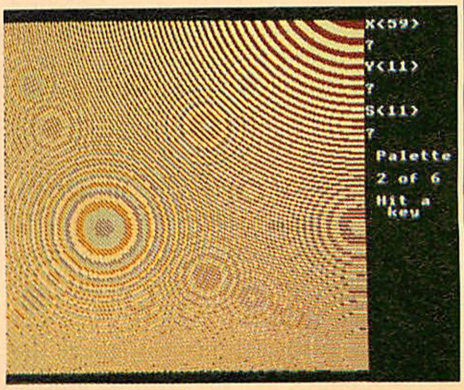
Each screen byte defines the colours of a row of four pixels with the two bits to describe the colour of each pixel interleaved with one another.

If you use Connett's algorithm to work out the four colours for a row of four pixels, you can store the information in one byte.

This byte points to an entry in the table at 'palette' to decide what is to be actually poked to the screen.







The process continues across the screen, and onto successive rows. A complete screen is drawn in less than three seconds.

SPEAK EASY

In the first of a new series on programming languages, Comal gets the once over

Neil Sykes

If you intend using your micro for more than just commercial software, you will be writing programs yourself. Although Basic is the natural place to start, perhaps moving on to assembler, there are many other computer languages more especially suited to particular applications.

Basic on a BBC micro is an immensely powerful environment but for some tasks it is far from perfect and to learn another, alien, language may be the better course.

Whether it is worth purchasing another language for your computer and, if so, which one, depends very much on the sort of programs you intend writing.

Here, and in future months, we will be taking a look at some of the languages themselves and the versions available.

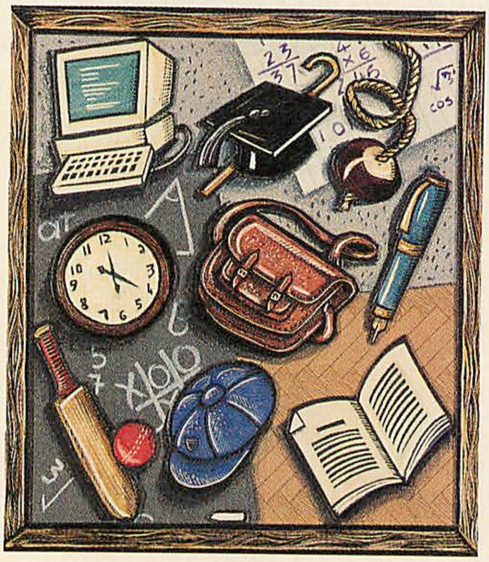
This won't be a tutorial in the language concerned – a wide range of books are available which do that more thoroughly – but to give you a 'feel' for each language and help you decide whether is has anything to offer.

Comal

Comal is a language which has probably suffered more than most from the success of BBC Basic. Like Basic, it was developed specifically for education but it incorporates many of the features of Pascal, a highly structured language which we shall look at later in the series. Many (but not all) of these features are part of BBC Basic and more have been added with Basic 5 on the Archimedes.

For owners of the Beeb and Master, Comal provides relatively cheap access to these facilities. Languages which have been written specifically for the educational field often suffer from an image problem – many feel they emphasize the academic rather than the practical aspects of programming and are of limited use in writing working programs. A few examples can soon dismiss this argument as far as Comal is concerned.

ILLUSTRATION BY ANGELA WOOD



The first thing you will notice about Comal is the language's practical handling of program input. Not only does it report an error immediately (if it can) instead of waiting for you to run the program, it also gives you a clue of where the error lies.

```
]20 IF x=4 THEN PRONT "Four"

Syntax error at line 20
  20IF x=4 THEN pront "Four"
                 ^
```

The system also incorporates a 'pretty-printer' – no matter how untidy you enter the program, it will always LIST neatly:

```
]10FOR X=1 TO 90
]20PRINT X,SIN RAD X
]30NEXT
```

LIST

```
10 FOR x:=1 TO 90 DO
20    PRINT x,SIN RAD x
30 NEXT x
```

The FOR•NEXT loop shown above was the only built-in looping structure in early versions of Basic. BBC Basic improved on this with REPEAT•UNTIL, allowing loops where the limits are not known in advance. However, this requires at least one, possibly fruitless, run through the loop and there are cases where such loops can look clumsy.

Comal manages to make this operation much easier:

```
1000 WHILE NOT EOF 1
1015   INPUT FILE 1, x#
1020   PRINT FILE 2, x#
1025 END WHILE
1030 CLOSE FILE 1
1035 CLOSE FILE 2
```

Unlike REPEAT, WHILE tests at the top of the loop – a feature so useful that WHILE•END WHILE has been included in Basic 5. Comal still includes REPEAT if you actually need it.

Also noticeable from the above is Comal's use of rather than % to indicate an integer variable, and its file handling statements which are a little friendlier than Basic's.

Decisions, decisions

Another situation where Basic can force you into untidy code is where a multi-way decision has to be taken:

```
   2000 IF x=1 THEN PRINT "O
ne" : GOTO 2050
   2005 IF x=2 THEN PRINT "T
wo" : GOTO 2050
   2010 IF x=3 THEN PRINT "T
hree" : GOTO 2050
   2040 PRINT "More than thr
ee"
```

So much more elegant in Comal's:

```
2000 CASE x OF
2005 WHEN 1
2010   PRINT "One"
2015 WHEN 2
2020   PRINT "Two"
2025 WHEN 3
2030   PRINT "Three"
2035 OTHERWISE
2040   PRINT "More than t
hree"
2050 END CASE
```

Again, Basic 5 offers a similar structure.

Comal will not allow more than one statement on a line. This does make the above example longer than its Basic equivalent but it is easier to read, program and modify.

Comal doesn't always require long-winded code. In some cases, it can be more

compact than Basic. One of the simplest Basic statements is:

```
X=X+N
```

How could this possibly be improved upon? Well, if you like to give variable names which suggest what they mean, it can be frustrating to type (and to read):

```
3000 moreusefulname=moreu
sefulname+longername
3010 PEOPLE(HOUSENUMBER)=
PEOPLE(HOUSENUMBER)-1
```

Comal has two operators: :+ and :− enabling you to write:

```
3000 veryusefulname :+ lo
ngername
3010 PEOPLE(HOUSENUMBER)
:- 1
```

which saves some typing but doesn't detract from readability. Comal is better than Basic for control of output, too. Basic requires you to access the operating system to direct output to the printer or serial port. Comal has the statements.

```
SELECT OUTPUT "D" - Display
   (screen) only
SELECT OUTPUT "P" - Parallel
   printer port and screen
SELECT OUTPUT "S" - Serial
   port and screen
```

which easily beats *FX3,n for simplicity. If you need more complex control of anything, all star-commands are still available, as in Basic.

Formatting

How often have you mixed figures and words in Basic to end up with:

```
Price is $        1.78
```

If you read your manual, you will know that by altering the resident variable @%, you can close up the embarrassing gap but this requires some tedious calculation. This is one of the few places where BBC Basic is worse than other versions, which have a command:

```
PRINT USING "#.##" : price
```

This command is much easier to use and is included in Comal. The Basic method of output control is still provided, though using the variable ZONE instead of @%.

Comal, like Basic, supports the use of procedures. In Basic, procedures are declared as follows:

```
4000 PROC textwindow(xl#,
yb#,xr#,yt#)
4010 VDU 28,xl#,yb#,xr#,y
t#
4020 END PROC
```

and called with:

```
120 EXEC textwindow(10,20,
30,10)
```

or just:

```
120 textwindow(10,20,30,10)
```

Here again, Comal has extra facilities, but these are perhaps not so obviously useful as those we have looked at so far. They concern the use of local variables. This subject is a major feature of many of the languages we shall be covering in this series, so it is worth a closer look.

In a Basic procedure such as:

```
5000 DEFPROCCENTRE(x$, y%)
5010 REM centres string x$
on line y%
5020 x% = 40 - (LEN x$)/2
5030 PRINT TAB(x%, y%) x$
5040 ENDPROC
```

the variable y% used in the procedure is not the same as any y% you may use in the main program – it only 'exists' while the procedure is running and so is described as a local variable. The variable x% in the above procedure is called a global variable – it exists throughout the program, so that if you have inadvertently used x% elsewhere in your code it will be changed by calling PROCCENTRE. Basic provides a method of overcoming this problem. Inserting the line:

```
5015 LOCAL x%
```

makes this x% separate from any other variable with the same name outside this procedure. This is automatically the case for x$ and y%, as they are arguments of the procedure.

When you first start to write programs these matters seem obscure, and it is much easier to have all variables available everywhere. As you write more, and longer, programs, you will often find that some of the functions and procedures you have written before are useful in later programs.

Including old procedures in new programs is more difficult if they depend on the value of some other variable which may not be present in your new program. It is a good idea to make as many variables as possible LOCAL.

All Comal's variables in procedures can be localised by writing it as follows:

```
5000 PROC CENTRE(xx$,yy#)
CLOSED
5010 // centres string xx$
at line yy#
5020 xx# := 40-LEN(xx$)/2
5030 PRINT TAB(xx#,yy#) xx$
5040 END PROC
```

The word CLOSED removes all connections between variables inside and outside the procedure.

If you actually need a variable from outside, this can still be done even with a CLOSED procedure by adding:

```
5015 IMPORT zz#
```

The variable zz from the main program can now be used inside the procedure. When you might want the procedure to alter one of its own arguments, Comal allows this also:

```
6000 PROC alter(REF a, REF b)
```

will pass any changes to a and b back to the main program.

Although CLOSED, IMPORT and REF do not appear the most exciting aspects of Comal, using them will benefit you in the future.

Having sung Comal's praises, we must answer the obvious question – it's so good, why doesn't everyone use it?

Comal does have disadvantages. All these extra commands have squeezed out one of BBC Basic's most useful facilities – the resident assembler. Machine code can still be used with Comal – CALL is still available – but it must be assembled using Basic.

Comal programs do not allow multi-statement lines. Programs can sometimes be longer and use more memory than in Basic, and they can also run more slowly.

Your programs are also tied to your machine, and those of the handful of other Comal users. This can, of course, be overcome by convincing your friends and colleagues of Comal's benefits!

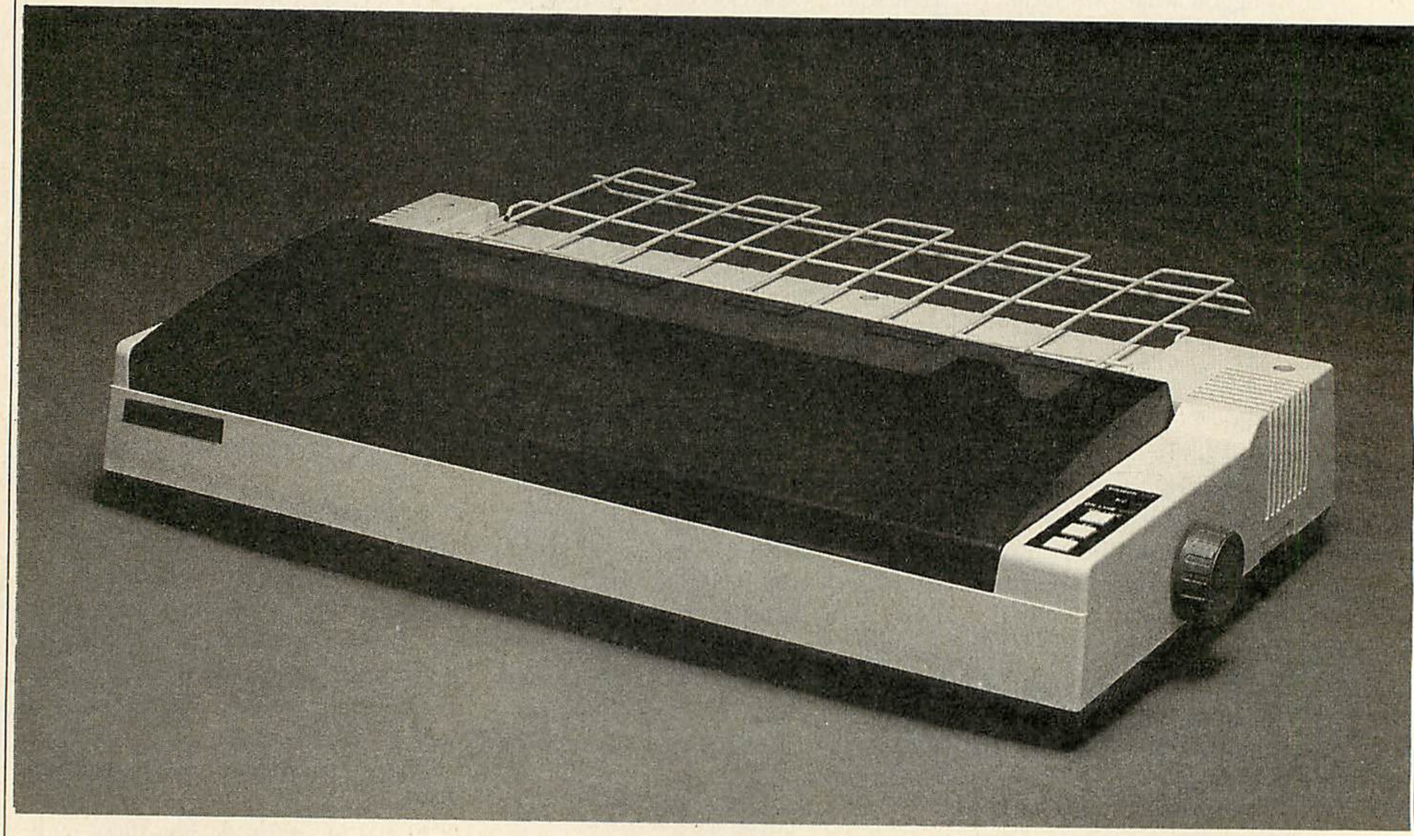
Although I admire BBC Basic, and wouldn't want to be without its built-in assembler, it is in many ways a shame Comal was not the BBC micros' 'native language'. If you don't use machine code, I think you will find Comal an excellent language. I firmly believe it deserves to be more popular.

Acorn's implementation of Comal on the BBC micro (the only one available) comes as a 16K sideways Rom, costing £43.70. No native code version has been produced for the Archimedes, so owners will have to run the BBC version under the 6502 emulator.

The manual supplied is comprehensive: the first part uses Comal as an introduction to programming, for which it is ideally suited and the second provides more advanced information for those who already know BBC Basic quite well.

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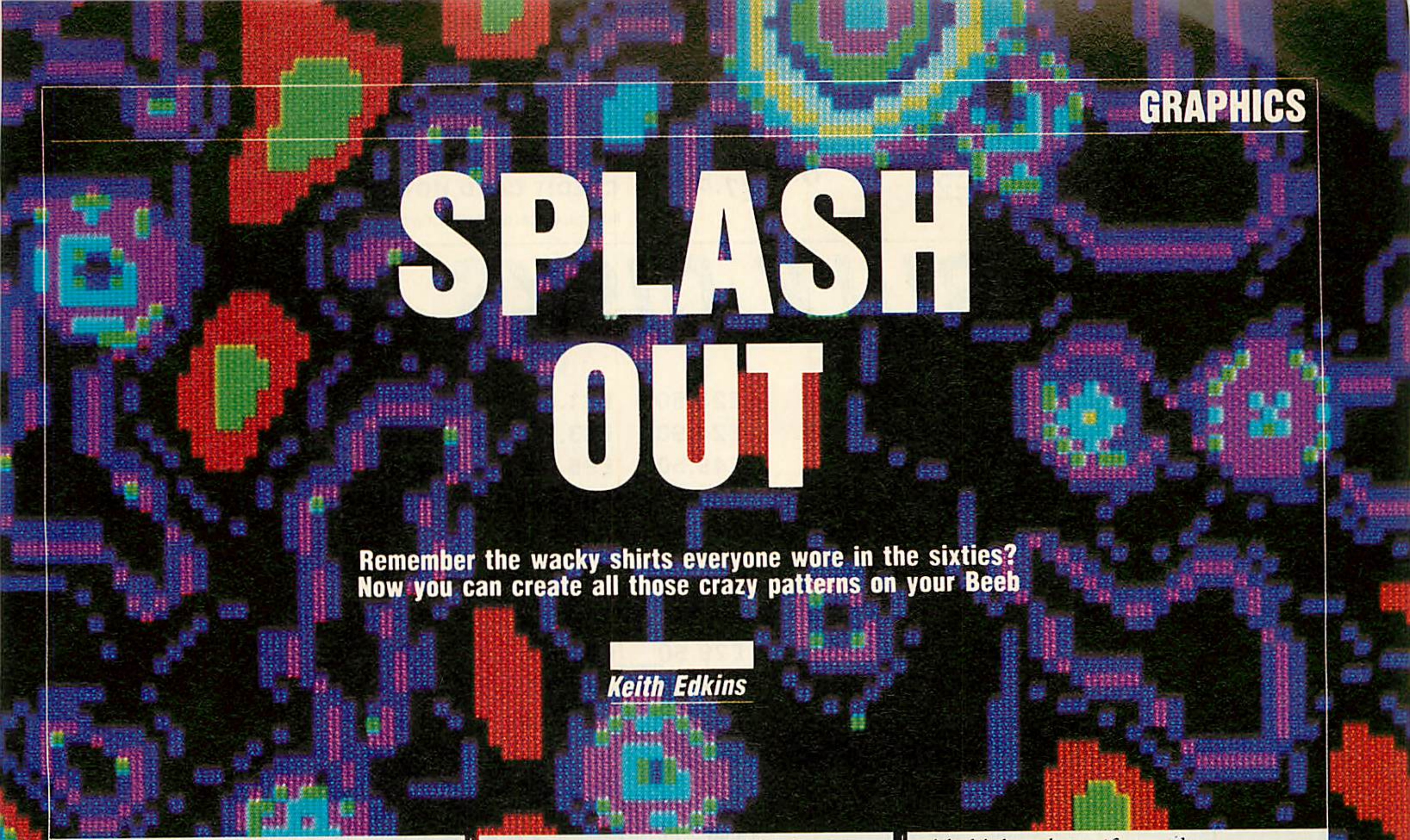
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SPLASH OUT

Remember the wacky shirts everyone wore in the sixties? Now you can create all those crazy patterns on your Beeb

Keith Edkins

Most Beeb owners reading Andrew Green's article on the Hodgepodge machine in the March issue of *BBC Acorn User*, would become annoyed at the limitations of the BBC micro – why can't we produce amazing effects such as these?

Well, maybe we can. I wrote a simple Basic program to investigate whether the Hodgepodge machine was possible on the BBC micro.

For this, the main limitations of the Beeb are that only 16 different values can easily be handled on the screen display and that the use of 16 screen states with a square pixel shape limits the size of the cell array to 160 x 128 cells.

The Basic program showed that BBC Hodgepodge was possible but since each generation took about 20 minutes to produce, as a spectacle, it hardly compared with watching paint dry!

I set about recoding the program using Osbyte calls to access the screen memory and succeeded in reducing the generation time to just over a minute. However the *Advanced User Guide* laid bare the details of the screen memory arrangement and two bit-twiddling routines later, I had the cycle time down to about seven seconds.

The Hodgepodge machine is a family of cellular automata devised by M Gerhardt and H Schuster at the University of Bielefeld in West Germany. The state of each cell can be represented by a number between zero and a maximum value n, state zero being 'dead', state n 'sick' and intervening states 'active'.

If a cell is sick, it dies at the next generation.

If it is active, its future state is given by the formula:

(S DIV A)+g

and if it is dead by:

(A DIV k1)+(B DIV k2)

where s is the sum of the states of the cell and its neighbours, A is the number of these which are active, B the number which are dead, and g, k1, k2 together with n are the parameters which control the operation of the machine.

The program listing in the yellow pages enables you to select the values of n and g, with k1 and k2 being fixed at 2 and 3 respectively.

You can also choose whether to regard the eight cells surrounding a given cell as its neighbours (as Green's Arc program does) or only the four orthogonal ones. Apparently Gerhardt and Schuster used this but it does not seem to give such interesting results.

You can also choose to start with the screen completely covered with a 'soup' of random values or with a specified number of discrete active cells. The patterns generated by these choices can be somewhat different. About 200 points normally generates a reasonable number of viable clusters.

You also have the option to reload a stored position and to continue from where you saved it.

The most complicated behaviour arises with high values of n and g as 2 or 3. Normally, with soup type starting conditions, these produce populations of active cells undergoing more-or-less periodic cycles of rise, sickness and collapse.

Sometimes, however, technicoloured spirals arise and expand to dominate the scene. Some values (15,2) leave the spirals as the final possessors of the universe. Others (14,3) give way to a lattice structure which is a period-3 oscillator.

Each new generation replaces the previous one as it is produced. The complete screen is then displayed for a second with the generation number in one corner before the scan starts again.

State zero is shown as black and state n as red. Other colours are allocated to the active states – if n > 7 some colours represent more than one state each.

Pressing ESCAPE will terminate operation at the end of a generation and present the menu again. Pressing any other key causes the current position to be saved to disc, and you can then change the file name from its default of HODGEPO. Note that each stored position occupies over 20K of disc space so an addiction to saving positions will cost you dearly in discs!

References

In Living Colour; by Andrew Green, *BBC Acorn User*, March 1989 (No 81).

The Hodgepodge Machine Makes Waves; by AK Dewdney, *Scientific American*, August 1988 (V259 ii).

IN THE POST

Just like any other computer language, you can have the benefit of Postscript with your BBC or Arc

David Atherton

Postscript is the powerful printer control language to be found on expensive laser printers and catered for in larger microcomputer systems (it's provided for in the Archimedes Risc OS.)

However, as mentioned in my initial article on the subject in the June issue of *BAU*, Postscript is only a computer language like any ohter, and as such anything from an Electron up to a 4Mb Archimedes can equally well produce output to laser printers and other devices equipped with the language.

I mentioned in the earlier article how the 'vector graphics' concept of Postscript was similar to the storage of BBC graphics commands – saving all the MOVE and DRAW commands rather than a bit-image map of the finished output.

The reason for this is that by storing the start and end points of lines, curves and so on, by simple scaling, rotation, and translation, the original picture can be recreated in almost any form. This is a highly flexible system and is very similar to the methods employed in recreating screen graphics with appropriate translations, by such products as the Computer Concepts' Graphics Extension Rom.

This brings to mind the Hints and Tips article which came from Peter Miller a few months ago, where graphics were spooled out to disc and then reloaded and redrawn after rotation, scaling and origin translation.

The program listed in the yellow pages combines these two ideas and provides a method of 'converting' BBC graphics commands to their Postscript equivalents. This allows you to include any BBC graphics (if you have the program that created them) in a Postscript document or to simply use a Postscript laser printer as a high resolution 'plotter'.

Also, because the scaling and translations required to work with BBC coordinates are determined in one block at the start of the Postscript, carefully altering these allows all sorts of interesting effects.

The program works with 'spooled' graphics files. The technique for doing this has been covered in the past, but is easy to explain, so I will repeat it.

First, run the program which creates the desired graphics on screen. This may be a demonstration such as the *Creative Graphics* suite, a program of your own or indeed a commercial package such as a drawing program or turtle graphics system. A 'paint' system such as *Superart* is also now suitable.

Now insert a SPOOL GRAPHIC statement (or any other filename) at the point before the first graphics commands are

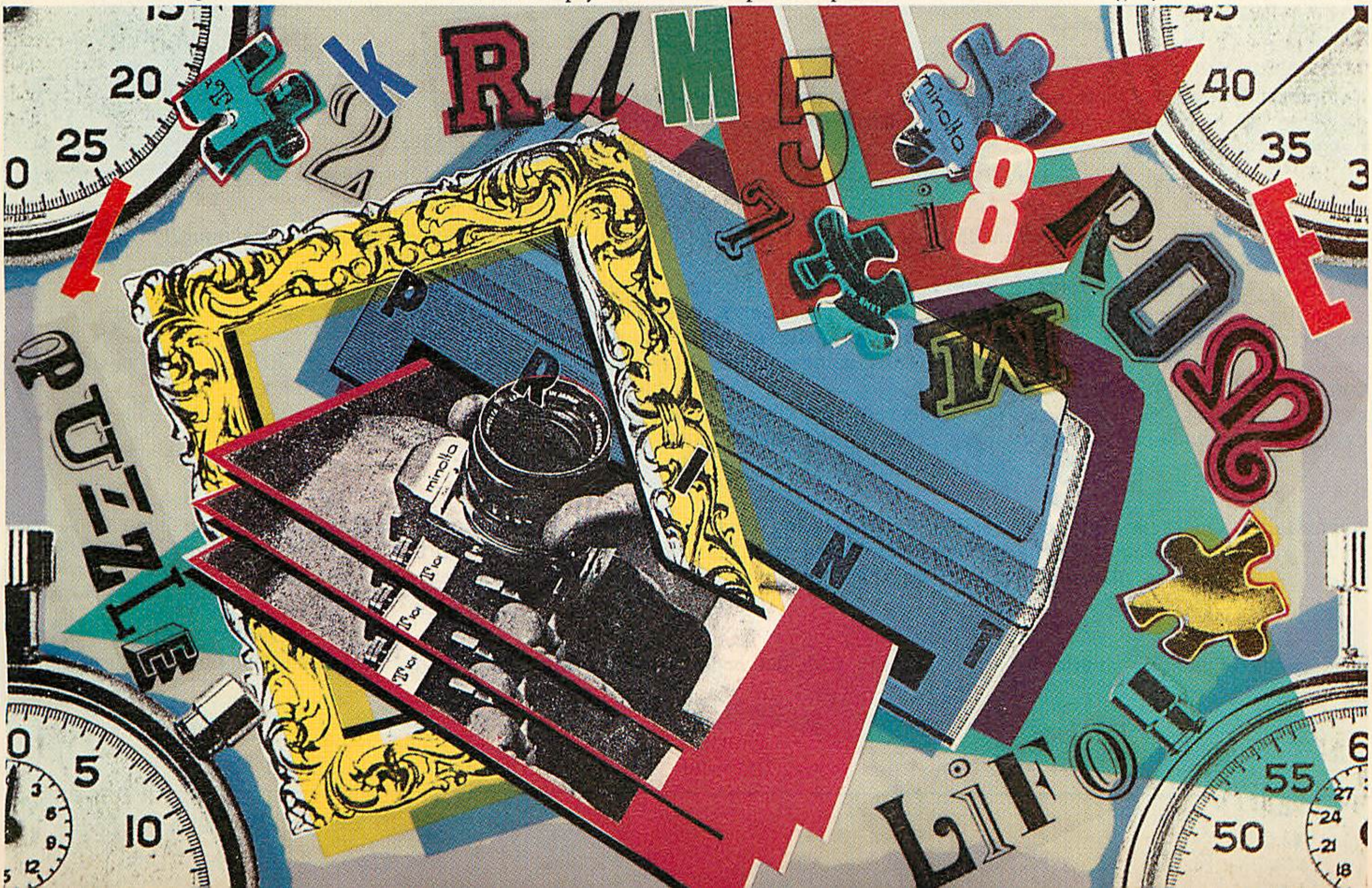


ILLUSTRATION BY PAUL BATEMAN

PINEAPPLE SOFTWARE

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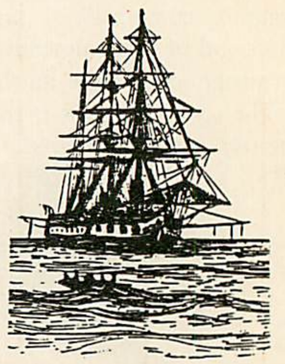
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output. At the point after the screen is completed, insert a *SPOOL statement with nothing following it.

Graphics are VDU codes just like text and so will spool to disc in just the same way. If you are using a commercial package, you will have to either find the appropriate points in the listing, or issue *SPOOL commands from the operating system prompt in the program.

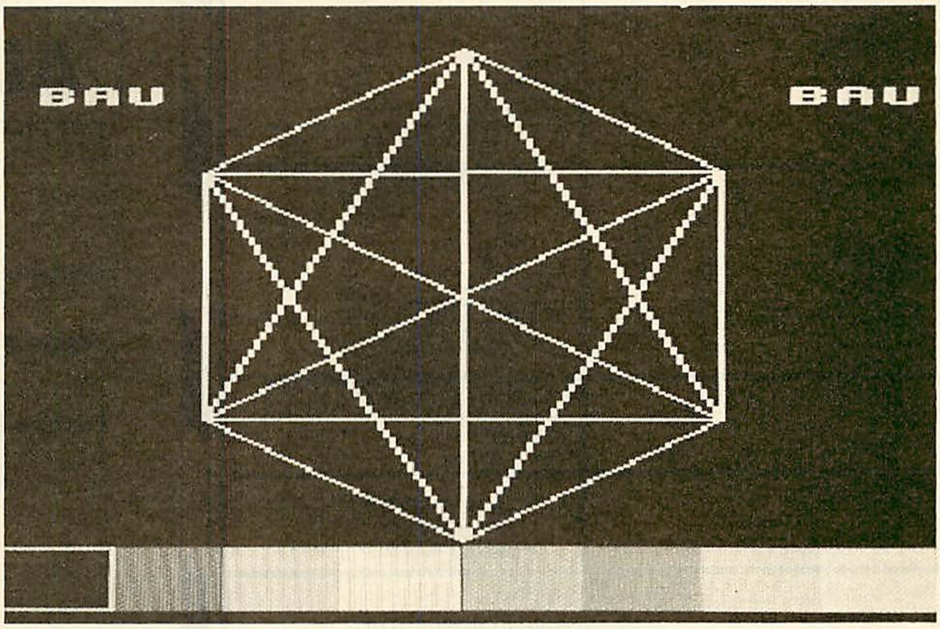
This creates a file called Graphic on the disc. To check this contains the correct data, type *TYPE GRAPHIC (use *PRINT on a Master). The graphics you stored should 'reply' on screen.

Now run the conversion program. This will read the Graphic file and create a new file on disc which will be pure Postscript, suitable for downloading to a compatible printer.

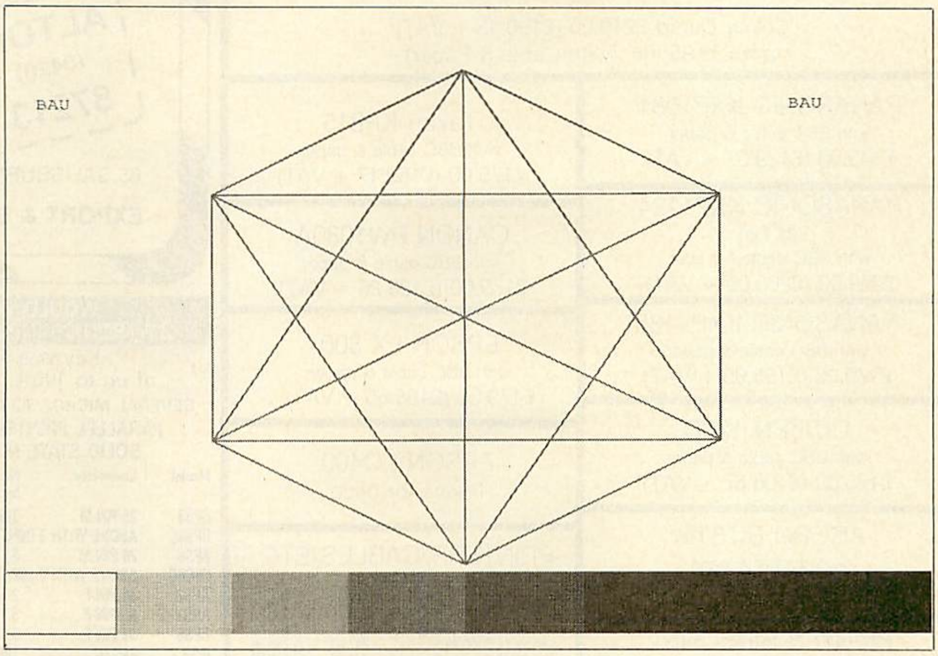
Your Postscript printer will be attached to one of your printer posts – either serial, parallel or network. The appropriate *FX5 setting will select it. To download your program, simply *TYPE the Postscript file, pressing CTRL-B after the 'E' of *TYPE. Press CTRL-C at the end.

The conversion program places a showpage operator at the end of the file, so the page with BBC graphics should appear seconds afterwards.

Note that when running the converter, if a filename of PRN (must be capitals) is given, then the output is sent directly to the printer and no file is created. If a filename SCR is given, the Postscript generated is shown on screen and no other record is made.



Simply organise your graphics on the screen of your BBC micro....



...and it will happily convert to Postscript and print out beautifully

How the program works

The conversion program is actually quite straightforward, as many BBC graphics commands have Postscript equivalents. The first thing to do is to set up the printer's page, so that it resembles a BBC screen. This involves selecting 'landscape' (wide) orientation, and scaling the resolution so that 1280x1024 pixels represent most of the page, This is done in PROCinit.

From here on in, the basic MOVE and DRAW commands can be converted into MOVETO and LINETO commands simply by using the screen co-ordinates, without any alteration.

This speeds things up enormously. The initialisation code works as follows. First it includes a header – which is just a REM statement containing the name of the program.

A procedure, bbcscreen, is defined. This moves the origin of the page to location 40,800 (the top left of the page – 0,0 are the co-ordinates the bottom at right hand corner), and then rotates all future output by 2 effectively creating a wide or landscape layout.

The scale command is used with arguments 0.5684 (x), and 0.4873 (y) to produce a printable area of 1280x1024 pixels from the (40,800) point. Scale defaults to a 773x538 – 773,538 is the rightmost topmost printable point. The current settings are divided by the arguments in the scale command.

LINES, MOVE and other plotting commands can then be issued using the same co-ordinate system as on the screen.

This setup done, the file is read in and the first byte is checked. This could be either a text character or a control code, which may or may not be followed by further parameter bytes.

The 'ignore' function filters out any control codes (and their associated parameters) which we wish to ignore. When a character to be processed is found, the main loop determines what should be done and various subroutines generate the necessary Postscript code.

Many graphics control codes are followed by parameters, which are picked up and used in the translated command. Ordinary text is simply output one character at a time through Postscript's 'show' operator. This does generate a lot of Postscript code but is a virtually foolproof method when text and graphics

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could be mixed in any format. When all the source file has been processed, a showpage is added to the end of the Postscript file, and both are closed. Most of the conversions are, as you can see, relatively simple.

-MOVE (BY) x,y becomes to x y (r)moveto

DRAW (BY) x,y becomes to x y (r)lineto

VDU29,x;y; becomes × y translate

PLOT 85,x,y becomes x1,y1 moveto, x2 y2 lineto, closepath, fill

VDU 24,x1;y1;x2;y2; becomes x1,y1 moveto, 3 linetos, closepath, clip

CLG become the same as the graphics window, but with 1 setgray fill

CIRCLE x,y,r becomes × y r 0 360 arc

and so on.

I have deliberately not introduced abbreviations for the Postscript commands (as is normal in these systems where commonly used keywords are defined as single letter variables) to keep the instructions legible.

Also I have embedded into the code a REM statement (preceded with %) at the start of each PLOT command, and this reports the PLOT code which is being translated before the chunk of Postscript code. This is also shown during translation as a report if the view% variable is set to TRUE.

The program works very well with graphics files which basically consist of absolute or relative MOVE and DRAW statements, with normal colour changes. These will appear on the printed output exactly as they appear on screen.

Also supported are the most popular graphics commands – the circle (outline and fill), rectangle, triangle and fill commands. It is not always safe to use relative plotting when using the shape commands.

Parallelograms, varying dot-dash patterns and the lines with end points missing have not been included to save space and time as they have limited appeal. You might, however, like to consider additional routines to be included in the program.

To add another PLOT command, simply enter a new IF statement in PROCplot. To add another completely new VDU code, add another IF line in the main program where the various VDU codes are tested.

Triangles and other graphics shapes rely on the previous graphics points, which the BBC operating system stores implicitly. As the Postscript system does not store previous graphics points in this way, special variables x1%,y1% and x2%,y2% have been set up which record at every plot the previous plot positions.

Uses for this program include transfer of graphics material to a high-quality laser printer (perhaps on your network) or if you wish, a phototypesetter.

Also, some forthcoming Archimedes products will allow you to insert files of Postscript text directly into larger documents, for example to include a graphic in a desktop publishing package.

Limitations

There are quite a few limitations to the Postscript translator. Because of the difficulty in maintaining two separate cursor positions, all text is printed at the graphics cursor. Rather than have extraneous text produced in all the wrong places I have set the program to simply ignore any text printed at the text cursor. In other words the graphics cursor must be on (a VDU 5 must have been issued) for the text to appear.

Accordingly, any 'text cursor' attributes, such as COLOUR (VDU 17) are also ignored.

Also, redefinition of characters under Postscript requires a full special font, so



this too has been left out, as have other VDU 23 operations such as redefining ECF patterns, and mark-space ratios.

These are omitted because of the treatment of colour, which involves dotted patterns for solid colours. To manipulate dot patterns even further was not felt to be worth the effort.

Palette redefinition, and a number of other VDU features are not appropriate to generating printed output and so are omitted. Postscript does not allow restoration of the full graphics window, once a smaller window has been defined, so although the code for making a graphics window is included, there is no way to restore the default or redefine a larger window.

Similarly, although graphics origin changes are supported, the original origin is lost and a further VDU 29 call will be treated as relative, not absolute. Because of the difficulties in representing colour only pure colour changes using VDU 18 (GCOL 0,x) are supported, and these are represented as shades of grey.

The following VDU codes are not implemented:

0, 1, 2, 3, 6, 7, 14, 15, 17, 19, 20, 21, 23, 24, 26, 27, 30, 31.

Also, some of the more esoteric PLOT commands such as sprite plotting and screen block moves are not supported. However, all these VDU codes are correctly filtered out, together with their parameters, when running the program.

The colour scheme sets each colour up as a grey level according to its number where the scale is from 0 (black) to 1 (paper white) and the algorithm simply spreads the colours out so, for example, in mode 1, colour 1 is 66% tone and colour 12 is 33% tone.

This may not reflect the correct shading for these colours but they can be altered by rewriting PROCgcol assigning specific tones (in the variable 'grey') to various colours.

Which machine?

All the information in this article was developed on an Apple Laserwriter Plus, running Postscript revision 38.0. More modern 3000dpi lasers work with a slightly larger printable area and with revision 47.0 of the language but this will not affect this program.

All the Postscript commands used are completely standard, and should also work on any Postscript 'clone' system, such as the Qume Crystalprint printers.

A TOUCH OF CLASS

The Concept Keyboard has come a long way since it first appeared. And the software just gets better

Chris Drage and Nick Evans

The Concept Keyboard (reviewed in *Acorn User*, May 1985) has continued to grow in popularity to the extent that today its impact at all levels of education can be measured by the fact that most important educational software packages include an option for its use.

The Concept Keyboard scores heavily over other input devices because an overlay can be designed not only to look informative and attractive but also to provide the most appropriate input medium for any particular application. Only the images or keypresses required need be displayed.

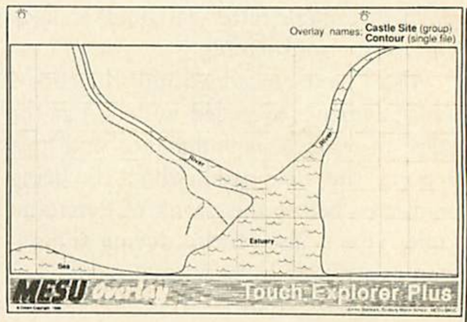
Over the years a number of excellent, 'framework' programs have emerged mainly from the Special Needs Software Centres (Semercs) and MESU. *Prompt/Writer, List Explorer* and *Touch Explorer* are typical of the genre. They provide a framework for the teacher's or pupil's own files. These programs are particularly valuable because lacking content, their use is not restricted to one particular age group or curriculum area. In addition, they invite imaginative use of the Concept Keyboard.

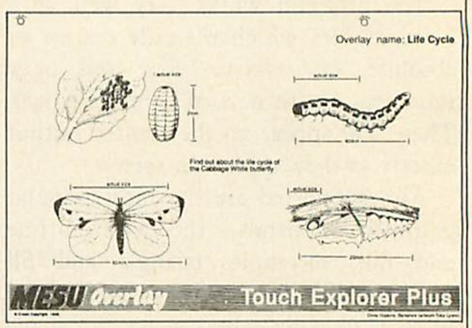
After two years and £100,000 development costs, *Touch Explorer* has undergone constant development and now, renamed *Touch Explorer Plus*, it has become a remarkably versatile software tool. It is one of the very few programs that can be used effectively right across the age, curriculum and ability range. This is also one of the few programs written to deliberately make the best educational use of the Concept Keyboard. There are three software discs, numerous sample A4 and A3 overlays, three function key strips and a comprehensive 166 page user guide. An additional (fourth) disc contains sample overlay files on the theme 'Midnight World'.

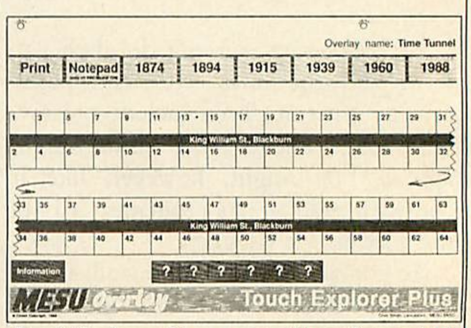
To describe *TE Plus* without recourse to practical examples is difficult as it is a framework. At its simplest it allows an image in a paper overlay to be explored horizontally as well as vertically in up to six layers of information (or vocabulary). Taking the example of 'Time Tunnel' (one of the sample files) a shopping street overlay can be explored through six periods in time, each 20 years apart.

Each level can be explored 'horizontally' to obtain a picture of the whole street at one particular period or at each five subsequent levels to explore continuity and change. The overlay need only have minimal information allowing the history of the street to unfold on screen as the children explore it.

Overlays can be pictures, maps, diagrams or even text. Pressing an area of the overlay displays a message relevant to that area. The content of the overlay and the information provided by its files are entirely up to the teacher. The messages at each level can be printed out at any time and if you run *TE Plus* on a Master 128, an additional notepad facility is available. The message for the overlay area just pressed is displayed in a wordprocessor environment (which is an adaptation of *Writer*). The child's response to the information or question can be typed at the end of the session or the pupil can take a hard copy of all the completed messages







Touch Explorer Plus: a versatile software tool

and responses to his/her desk for further analysis.

This file can be added to at a later session or loaded into a wordprocessor as Ascii text for compilation into a final piece of written work.

The program automatically stores the

last 100 keypresses so the teacher can obtain a printout to see how individuals/groups are getting on. One particular feature of *TE Plus* is a speech synthesiser option, of particular interest to special needs teachers.

This option along with many others (printer, sound, key repeat rate etc) can be set with an initial menu of Start-up Conditions in the user disc.

It is the user disc from which single overlays, overlay groups, the notepad and speech are used. Explorations can be loaded, saved and printed from the disc. The Overlay Handling disc allows you to create and edit single overlays and to form these into overlay groups (one for each level of exploration) and edit them.

The third disc contains utilities for printing paper overlays (A3 overlays printed on standard paper must be cut and pasted together), copying *TE Plus* discs, deleting and copying overlays and notes and for file conversions (Ascii to *TE Plus* and vice versa).

Creating an overlay file could not be simpler. Once the paper overlay is planned, all work proceeds using the overlay handling disc. The process is controlled by menus and a graphic representation of the Concept Keyboard. Squares are defined and the appropriate message entered to be copied, deleted or altered. Single overlays can have five 'control' squares for PRINT, USE NOTEPAD, SPEAK, WIPE and FINISH. To these control squares can be added MOVE UP A LEVEL, MOVE DOWN A LEVEL, GO TO LEVEL (1,2,3 etc). Once a set of single overlay files have been created these can be assembled into an overlay group (one overlay for each *TE Plus* level).

A number of examples of *TE Plus* files are included in the package – all of which have been developed in schools. Simulations are useful for helping children understand some of the factors which affect history. 'Castle Site' is a *TE Plus* matrix overlay containing a simple map depicting two rivers branching from an estuary but no more. The children's task is to discover the best site to build a castle shortly after the Normal conquest.

There are three levels: the first gives the height above sea-level for each square on the map. The second level provides information about the land and vegetation and the third gives detailed information about the wildlife and village on the site.

By exploring the site at each level a picture of the site begins to emerge. The



Children can explore several levels of meaning in one image



Nocturnal activities can be examined

pupils could be asked to map and model the site and then write a letter to King William justifying their choice.

In this example *TE Plus* lends itself to problem solving, information gathering and discussion in groups. With the 'Castle Site' overlay humanities teachers can begin to see the possibilities of using computers to develop empathy in history at the lower secondary level.

However, *TE Plus* is not restricted to history, as the 'Maths Patterns' overlay files attest. These two files are designed to demonstrate how the program can be used to develop deductive skills and reasoning using a number grid.

At the simplest level the children complete the grid with number 1-50 then try to deduce the pattern from the information given on the overlay. At a more difficult level, each of the five rows can hold a different pattern to be completed. Similarly, *TE Plus* has science applications. Another sample overlay deals with four stages of the life cycle of a butterfly. Here the overlay is designed to help learners discover the different stages of the life cycle in sequence.

Touch Explorer Plus can be used to initiate or supplement and enhance topic work in schools. 'Midnight World' is a compilation of overlay files on a theme of nightime. One overlay, 'Night Town' depicts a street map of a town and uses six overlay files to help children discover what is happening there at different times during the night. 'Night Garden' comprises three groups of overlay files based on the chart 'The Garden At Night' (Pictorial Charts Education Trust) which forms the A3 overlay.

The user guide suggests many follow-up activities and suggests how the work can be integrated with other curriculum areas. One of the strengths of *TE Plus* is its flexibility. The sample overlay files can be adapted to suit specific needs or the picture overlays used to form the basis for new overlay files.

MESU is developing a *Touch Explorer* Sampler Pack to provide further examples, ideas and starting points.

Touch Explorer Plus is one of the most important software releases from NCET/MESU. With this the Concept Keyboard has really come of age offering unlimited possibilities for those teachers willing to exploit its potential.

Touch Explorer Plus *is available from the Microelectronics Education Support Unit, Unit 6, Sir William Lyons Road, Science Park, University of Warwick, Coventry, CV4 7EZ for the BBC B, B+, Master 128. School price: £17.50.*

S·C·A·N· LIGHT

The Hardware

Scan-Light consists of a half-width expansion board (that will fit into any Archimedes), with on board ROM software and a choice of scanners. The hand-held scanner is able to scan or digitise pictures, text, signatures, diagrams from loose pages and books at 200 dots per inch. The full width version can scan complete A4 pages of information while the half-width scanner is restricted to a scan width of 105mm (just over 4 inches).

Both scanners have a brightness control and two different scan modes—normal monochrome mode suitable for line graphics or text, and a dithered mode suitable for photographs or half tone pictures.

Scanning a document is simple, the scanner is placed at the top of the page, the scan button is held down and the scanner dragged down the page. As it moves over the document the scanned image is shown on screen and captured in the computer's memory.

The Software

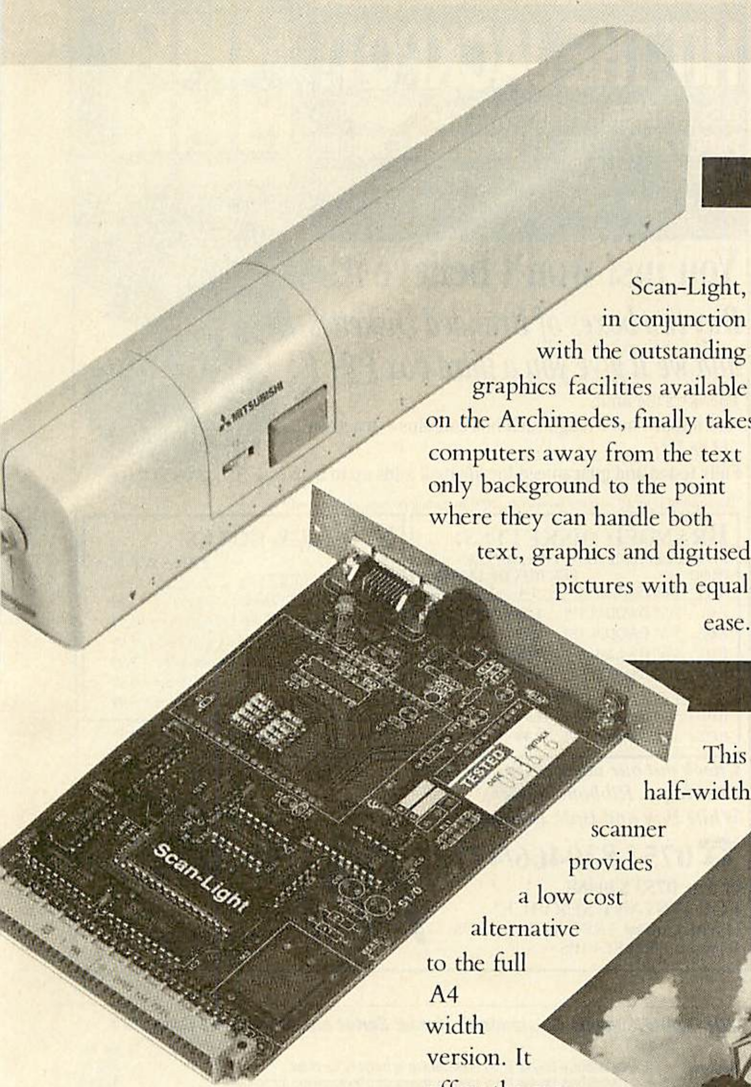
All the necessary scanner controlling software is included on a ROM as part of the interface board—it does not require programs to be loaded from disc.

The software is WIMP based and completely RISCOS compatible. This ensures it is both easy to use (all its features are controlled by menu options) and that it can multi-task with other RISCOS applications and run under the RISCOS desktop. (It is also completely compatible with the older Arthur operating system). Software features include:

- A full page preview is displayed, as the image is scanned, showing the digitised image as the scan progresses down the page.
- Once scanned the image is shown full size within a re-sizeable, scrollable window. The image may be magnified or reduced by any amount from 1% to 999% of original size.
- Pixel editing facilities allow individual pixels to be drawn or "undrawn".
- A variety of printer drivers is included to transfer the image to a range of dot matrix, inkjet and laser printers.
- A special grey-scale preview mode anti-aliases the scanned image to produce a true grey-level picture, allowing near photographic quality images to be obtained.
- Scanned images, or any selected part, may be saved in a variety of ways:
  (i) As a compressed data file (saves disc space).
  (ii) As a monochrome sprite.
  (iii) As a 16 grey-level anti-aliased sprite.

The latter option is ideal for incorporating pictures or photographs into other programs such as Paint and Draw or any DTP program such as the Acorn DTP or Impression programs.





Scan-Light

Now you have twice the choice!

Scan-Light, in conjunction with the outstanding graphics facilities available on the Archimedes, finally takes computers away from the text only background to the point where they can handle both text, graphics and digitised pictures with equal ease.

Scan-Light Junior



This half-width scanner provides a low cost alternative to the full A4 width version. It offers the same facilities and runs with exactly the same software but is limited to capturing 4 inch wide images. In addition, Scan-Light Junior offers a choice of scan resolutions from 100 dpi to ultra-high 400 dpi.

Prices

Scan-Light Junior £189.00 + VAT for half-width scanner, interface board and software.

Scan-Light £449.00 + VAT for A4 width scanner, software and interface board.

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Scan-Light runs on both the Arthur and RISCOS operating systems, and requires a 1 MByte machine.

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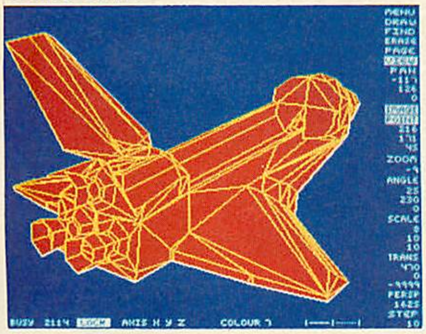
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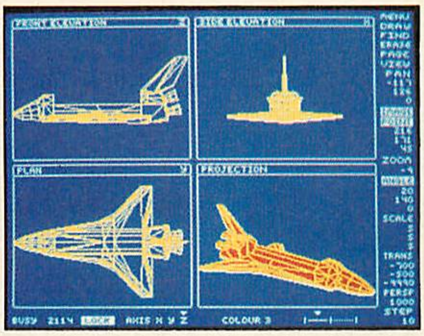


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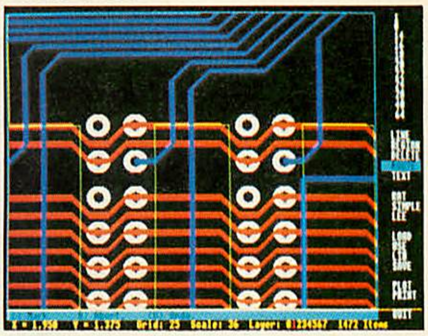
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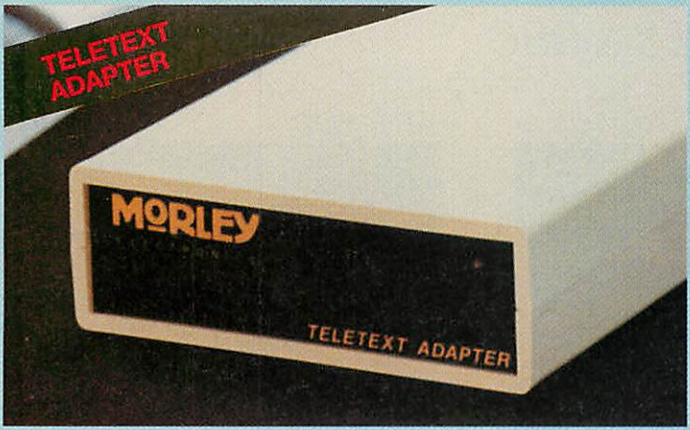
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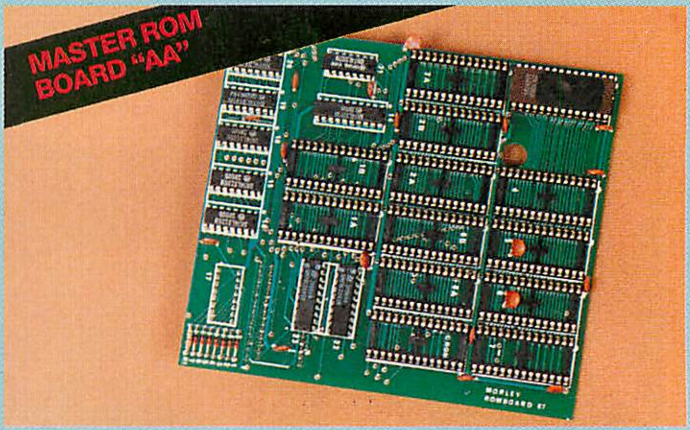
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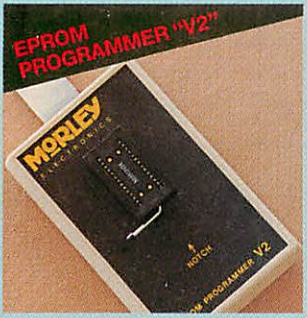
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YELLOW PAGES

COMPATIBILITY

Program	Page	BBC B	B+/128	Master 128	Master Compact	Electron	Arc	6502SP/ Turbo	ADFS	Econet	Shadow RAM	Monthly Disc
Interlude	19											
Listing 1		■	■	■		■			■		■	■
Hints & Tips	25											
Listing 1		■	■	■	■	■		■	■	■	■	■
Listing 2		■	■	■	■	■	■	■	■	■	■	■
Listing 3		■	■	■	■	■		■	■	■	■	■
Listing 4		■	■	■	■	■	■	■	■	■	■	■
Listing 5		■	■	■	■			■	■	■	■	■
Arc Agora	30											
Listings 1-4							■		■	■	■	■
Lie of the Land	57											
Listing 1		■	■	■	■	■		■	■	■	■	■
Listing 2							■	■	■	■	■	■
In the Post	73											
Listing 1		■	■	■	■	■	■	■	■	■	■	■
Arcface	61											
Listings 1-2							■			■	■	■
Back to the Wall	65											
Listing 1		■	■	■	■			■	■	■	■	■
Splash Out	71											
Listing 1		■	■	■	■			■	■	■	■	■

See Interlude, page 19

Listing 1. Indiana

```
"4bass" []              "9bass1" []
"9bass2" []             "RUN" []
"cello" []              "drum" []
"flute" []              "info" []
"lead" []               "mix" []
"part1" []              "part2" []
"part3" []              "part4" []
"part5" []              "part6" []
"part7" []              "part8" []

"4bass" [%STAFF
SCORE48,4BAR
-1:24,C!CCcCCcC!!
]

"9bass1" [%STAFF
SCORE48,9BAR
-1:24,C!CCcCCcCcCCcCCcCcC!!
]

"9bass2" [%STAFF
SCORE48,9BAR
-1:24,C!CCcCCcCCcCCcCCcCC!!
]

"RUN" [info
"12345678" PLAY
]

"cello" [%STAFF
SCORE48,4BAR
0:24,G//+f~+f///!!C//b~b/!b/!!
]

"drum" [%STAFF
SCORE48,9BAR
-1:24,C//g~g///C//g~g/C/g/!!
]

"flute" [%STAFF
% SCORE
% 0:6,ABC!!48,4BAR96,+CC!!
1:    48,4BAR96,+CC!!
0:96,B48,-B24,~-B6,~-BaBC!!
]

"info" [7 MODE DISPLAY
%                 Indiana
%
%        A (small) experiment in
%        polyrhythmic  serialism
%         (Nevermind the words -
%         listen to the music!)
%Each of the parts was constructed and
%can be examined in the Stave Editor.
%9/4 and 4/4 phrases play against each
%other. "lead" contains an 'extra' 1/8th
%note so it continually overlaps the
%other parts - the additional notes in
%part5 make the parts finish together.
%Alter the numbers in the FOR()FOR loops
%to taste, change the mix - experiment!
]

"lead" [%STAFF
SCORE48,4BAR
1:24,+FGf-ec-Edb!!C+fG+CC+fG+C!!
1:24,CD-EFGCb+f!!f-Bae-e-Ag+c!!c
]

"mix" [M5MIX
1 SHARE 1 VOICES Upright
 1 VOICE 128 VOL 0 PAN
2 SHARE 1 VOICES Ringsyn
 1 VOICE 116 VOL -3 PAN
3 SHARE 1 VOICES Ringsyn
 1 VOICE 116 VOL 3 PAN
4 SHARE 1 VOICES Ringsyn
 1 VOICE 116 VOL -1 PAN
5 SHARE 1 VOICES Vibglock
```

Continued ►

◀ Interlude. Listing 1 continued

```
  1 VOICE 128 VOL 0 PAN
6 SHARE 1 VOICES Yakbell
  1 VOICE 128 VOL -1 PAN
7 SHARE 1 VOICES Moog
  1 VOICE 116 VOL 1 PAN
8 SHARE 1 VOICES Yakbell
  1 VOICE 128 VOL 1 PAN
PNUM SHARE
]

"part1" [32 FOR( drum )FOR ^
]

"part2" [72 FOR( 4bass )FOR ^
]

"part3" [32 FOR( 9bass1 )FOR ^
]

"part4" [32 FOR( 9bass2 )FOR ^
]

"part5" [17 FOR( lead )FOR
1:24,+FGf-ec-Edb C+fG+CC+f ^
]

"part6" [36 FOR( flute )FOR ^
]

"part7" [36 FOR( cello )FOR ^
]

"part8" [5@ 36 FOR( flute )FOR ^
]
```

See Hints & Tips, page 25

Listing 1. Program converter

```
   10 REM Basic to ASCII
 converter
   20 REM For B/B+/E/M/C
   30 REM by David Flann
agan
   40 REM (c) BAU Sep 89
   50 :
   60 PROCsetup
   70 PROCassemble
   80 PROCchecksum(codes
t,P%-1,&4BDA)
   90 PROCsave(codest,P%
-1,"ASCII")
  100 END
  110 :
  120 DEF PROCsetup
  130 hipage=&18
  140 linest=&70
  150 length=&72
  160 ystore=&73
  170 handle=&74
  180 lonumb=&75
  190 hinumb=&76
  200 dummy1=&77
  210 dummy2=&78
  220 osargs=&FFDA
  230 osfind=&FFCE
  240 osbput=&FFD4
  250 codest=&900
  260 ENDPROC
  270 :
  280 DEF PROCassemble
  290 FOR pass=0 TO 3 ST
EP 3
  300 P%=codest
  310 [OPT pass
  320 LDY #0
  330 STY dummy1
  340 STY dummy2
  350 LDA #1
  360 LDX #linest
  370 JSR osargs
  380 LDA #128
  390 LDX linest
  400 LDY linest+1
  410 JSR osfind
  420 CMP #0
  430 BNE noerror
  440 RTS
  450 .noerror
  460 STA handle
  470 LDA #0
  480 STA linest
  490 LDA hipage
  500 STA linest+1
  510 .outloop
  520 LDY #1
  530 LDA (linest),Y
  540 BMI close
  550 STA hinumb
  560 INY
  570 LDA (linest),Y
  580 STA lonumb
  590 INY
  600 STY ystore
  610 LDX #0
  620 .convert
  630 LDY #32
  640 LDA #0
  650 .tendiv
  660 ASL lonumb
  670 ROL hinumb
  680 ROL dummy1
  690 ROL dummy2
  700 ROL A
  710 CMP #10
  720 BCC less
  730 SBC #10
  740 INC lonumb
  750 .less
  760 DEY
  770 BNE tendiv
  780 CLC
  790 ADC #48
  800 PHA
  810 INX
  820 LDA lonumb
  830 ORA hinumb
  840 ORA dummy1
  850 ORA dummy2
  860 BNE convert
  870 LDY handle
  880 .putnumb
  890 PLA
  900 JSR osbput
  910 DEX
  920 BNE putnumb
  930 LDY ystore
  940 LDA (linest),Y
  950 STA length
  960 INY
  970 .inloop
  980 LDA (linest),Y
  990 STY ystore
 1000 LDY handle
 1010 JSR osbput
 1020 LDY ystore
 1030 INY
 1040 CPY length
 1050 BNE inloop
 1060 LDA #13
 1070 LDY handle
 1080 JSR osbput
 1090 LDA linest
 1100 CLC
 1110 ADC length
 1120 STA linest
 1130 LDA linest+1
 1140 ADC #0
 1150 STA linest+1
 1160 JMP outloop
 1170 .close
 1180 LDA #0
 1190 LDY handle
 1200 JMP osfind
 1210 ]NEXT
 1220 ENDPROC
 1230 :
 1240 DEF PROCchecksum(S
%,E%,C%)
 1250 T%=0
 1260 FOR B%=S% TO E%
 1270 T%=T%+?B%
 1280 NEXT
 1290 IF T%=C% ENDPROC
 1300 PRINT"Checksum err
or - check listing"
 1310 END
 1320 :
 1330 DEF PROCsave(S%,E%
,N$)
 1340 B$="*SAVE "+N$+" "
+STR$~S%+" "+STR$~E%
 1350 PRINT"Press <RETUR
N> to save code"
 1360 IF GET<>13 ENDPROC
 1370 PRINT B$
 1380 PROCoscli(B$)
 1390 ENDPROC
 1400 :
 1410 DEF PROCoscli($&A0
0)
 1420 X%=0:Y%=10
 1430 CALL&FFF7
 1440 ENDPROC
```

Listings 2-5

```
   10 REM FKey Strip Gen
erator
   20 REM by Andrew Hinc
hcliffe
   30 REM for B/B+/E/M/C
/A
   40 REM (c) BAU Sep 89
   50 :
   60 MODE1
   70 W%=60
   80 T%=2
   90 DIM M$(T%)
  100 VDU2,1,27,1,64
  110 PRINT''"Function K
ey Strip"
  120 PRINT "By Andrew H
inchcliffe"'
  130 VDU1,27,1,ASC"A",1
,8
  140 B%=128
  150 G%=255
  160 R%=0
  170 D%=0
  180 F%=0
  190 U%=3
  200 G$=CHR$1+CHR$27+CH
R$1+"K"+CHR$1+CHR$(W%+16
)+CHR$1+CHR$0
  210 FOR P%=1 TO T%
  220 READ M$(P%)
  230 M$(P%)=M$(P%)+STRI
NG$(81-LENM$(P%)," ")
  240 NEXT
  250 FOR P%=1 TO T%
  260 PRINTG$CHR$1CHR$25
5STRING$(W%+14,CHR$1+CHR
$128)CHR$1CHR$255STRING$
(U%,CHR$1+" ");
  270 NEXT
  280 VDU1,10
  290 REPEAT
  300 R%=R%+8
  310 F%=F%+1
  320 IF D%*54<R% C%=R%-
(D%*54):D%=D%+1:B%=2^(C%
-1) ELSE B%=0
  330 IF D%=12 THEN G%=G
%-(B%-1)
  340 FOR P%=1 TO T%
  350 PRINT G$;
  360 ?&70=ASCMID$(M$(P%
),F%,1)
  370 A%=10
  380 X%=&70
  390 Y%=0
  400 CALL &FFF1
  410 VDU 1,255,1,0
  420 FOR I%=8 TO 1 STEP
 -1
  430 VDU 1,?(&70+I%)
  440 NEXT
  450 VDU 1,0,1,0
  460 FOR I%=1 TO W%
  470 E%=B%
  480 IF I%=1 OR I%MOD(W
%/3)=0 E%=G%
  490 VDU 1,E%
  500 NEXT
  510 VDU 1,0,1,0,1,0,1,
255
  520 PRINT STRING$(U%,C
HR$1+" ");
  530 NEXT
  540 VDU 1,10
  550 UNTIL D%=12
  560 FOR P%=1 TO T%
  570 PRINTG$CHR$1CHR$25
5STRING$(W%+14,CHR$1+CHR
$1)CHR$1CHR$255STRING$(U
%,CHR$1+" ");
  580 NEXT
  590 VDU1,10,1,12,1,27,
1,64,3
  600 PRINT"Finished"
  610 END
  620 DATA "The First On
e","The Second One","The
 Third","The Fourth","Th
e Fifth","The Sixth"
```

```
   10 REM Double width p
rinting
   20 REM by Phil Bender
   30 REM for B/B+/E/M/C
   40 REM (c) BAU Sep 89
   50 :
   60 DIM code% 200
   70 PROCassem
   80 PRINT "This is a d
emonstration"
   90 PROCprint("of doub
le width printing")
  100 PRINT'
  110 END
  120 :
  130 DEFPROCprint(X$)
  140 LOCAL j%
  150 FOR j%=1 TO LEN X$
  160 A%=ASC MID$(X$,j%,
1)
  170 CALL code%
  180 NEXT
  190 ENDPROC
  200 :
  210 DEF PROCassem
  220 osword=&FFF1
  230 oswrch=&FFEE
  240 P%=code%
  250 [OPT 2
  260 STA &70
  270 LDA #10
  280 LDX #&70
  290 LDY #0
  300 JSR osword
  310 LDA #2
  320 STA &79
  330 .loop1
  340 LDA #23
  350 JSR oswrch
  360 LDA #255
  370 JSR oswrch
  380 LDX #1
  390 .loop2
  400 LDA #0
  410 LDY#4
  420 .loop3
  430 ASL &70,X
  440 PHP
  450 ROL A
  460 PLP
  470 ROL A
```

Continued ▶

◀ Hints & Tips. Listing 3 continued

```
  480 DEY
  490 BNE loop3
  500 JSR oswrch
  510 INX
  520 CPX #9
  530 BNE loop2
  540 LDA #255
  550 JSR oswrch
  560 DEC &79
  570 BNE loop1
  580 RTS
  590 ]
  600 ENDPROC
```

```
   10 REM Input double h
eight
   20 REM by Jeremy Soll
y
   30 REM for B/B+/M/C/A
   40 REM (c) BAU Sep 89
   50 :
   60 MODE 7
   70 a$=FNask("Prompt :
")
   80 PRINT''CHR$141 a$'
CHR$141 a$
   90 END
  100 :
  110 DEFFNask(q$)
  120 LOCAL count,v,stri
ng$
  130 v=VPOS
  140 FORI%=0TO1
  150 PRINTTAB(0,v+I%);C
HR$141;q$;
  160 NEXT
  170 REPEAT
  180 g=GET
  190 IF g=13 GOTO 300
  200 FOR I%=0 TO 1
  210 PRINT TAB(LENq$+2+
count,v+I%);CHR$g;
  220 NEXT
  230 IF g<>127 GOTO 280
  240 IF count=0 VDU 32:
GOTO 300
  250 string$=LEFT$(stri
ng$,LENstring$-1)
  260 count=count-1
  270 GOTO 300
  280 string$=string$+CH
R$g
  290 count=count+1
  300 UNTIL g=13
  310 =string$
```

```
   10 REM New Screen Mod
es
   20 REM by David Flann
agan
   30 REM for B/B+/M/C
   40 REM (c) BAU Sep 89
   50 :
   60 PRINT "Press 1 for
 4 colour 640x512 mode"
   70 PRINT "Press 2 for
 8 colour 320x512 mode"
   80 REPEAT
   90 g=GET-48
  100 UNTIL g=1 OR g=2
  110 IF g=2 GOTO 270
  120 :
  130 MODE 4
  140 *FX154,156
  150 VDU 19;8;0;
  160 VDU 19,1,14,0;0;
  170 VDU 23;2,15;0;0;0;
  180 VDU 23;7,13;0;0;0;
  190 *FX9,1
  200 *FX10,1
  210 MOVE 640,0
  220 MOVE 640,1020
  230 PLOT 85,1280,0
  240 PLOT 85,1280,1020
  250 END
  260 :
  270 MODE 5
  280 *FX154 216
  290 VDU 19;8;0;
  300 VDU 19,1,14,0;0;
  310 VDU 19.2,10,0;0;
  320 VDU19,3,11,0;0;
  330 VDU 23;2,15;0;0;0
  340 VDU 23;7,13;0;0;0
  350 *FX9,1
  360 *FX10,1
  370 FOR a=1 TO 3
  380 GCOL 0,a
  390 MOVE a*319,0
  400 MOVE a*319,1020
  410 PLOT 85,(a+1)*319,
0
  420 PLOT 85,(a+1)*319,
1020
  430 NEXT
  440 END
```

See Arc Agora, page 30

Listing 1. Module filing system

```
   10 REM >Agora1
   20 REM MFS Source
   30 REM by Dave Acton
   40 REM for Archimedes
   50 REM (c) BAU Septem
ber 1989
   60 :
   70 MODE 12
   80 maxf=20
   90 overheads=4
  100 DIM name$(maxf),fi
le$(maxf),start(maxf),si
ze(maxf),load(maxf),exec
(maxf)
  110 num=0
  120 spare=(HIMEM-END-&
4000) AND &FFFFC00
  130 PRINT "MFS Creator
"
  140 DIM code% spare
  150 sparek=spare/1024-
overheads
  160 left=sparek*1024
  170 COLOUR 3
  180 PRINT "Workspace:
";sparek;"K"
  190 VDU 28,0,31,79,3
  200 COLOUR 7
  210 REPEAT
  220 IF sparek<64 PROCi
ns(STR$(sparek)) ELSE PR
OCins("64")
  230 INPUT "Enter maxim
um module size in K: "ma
x
  240 UNTIL max>overhead
s AND max<=sparek
  250 max=max*1024
  260 left=max-overheads
*1024
  270 done=FALSE
  280 CLS
  290 REPEAT
  300 PRINT'
  310 COLOUR 3
  320 IF num>0 THEN
  330 FOR n=0 TO num-1
  340 PRINT """"name$(n)
"""  (";size(n);" bytes)
"
  350 NEXT
  360 ENDIF
  370 PRINT "(Bytes left
=";left DIV 1024;"K)"
  380 COLOUR 7
  390 PRINT ''"Enter fil
ename for inclusion in M
FS or a * command."
  400 PRINT "(Press RETU
RN by itself to end.) ";
  410 INPUT " >"a$
  420 file$(num)=a$
  430 WHILE ASC(a$)=32
  440 a$=MID$(a$,2)
  450 ENDWHILE
  460 IF a$="" THEN
  470 done=TRUE
  480 ELSE
  490 IF ASC(a$)=42 THEN
  500 SYS "OS_CLI",a$
  510 ELSE
  520 SYS "XOS_File",5,a
$ TO type,,load(num),exe
c(num),size(num)
  530 IF type=1 THEN
  540 IF (size(num)<=lef
t) THEN
  550 file$(num)=a$
  560 REPEAT
  570 PROCins(file$(num)
)
  580 INPUT "Enter name
for file in MFS: "name$(
num)
  590 UNTIL name$(num)<>
""
  600 left-=size(num)
  610 num+=1
  620 ELSE
  630 COLOUR 1
  640 PRINT "Sorry, '"a$
"' will not fit in MFS"
  650 ENDIF
  660 ELSE
  670 COLOUR 1
  680 PRINT"No such file
"
  690 ENDIF
  700 ENDIF
  710 ENDIF
  720 UNTIL done OR num=
maxf
  730 IF num=0 END
  740 :
  750 vbit=1<<28:cbit=1<
<29
  760 sp=13:link=14:pc=1
5
  770 FOR pass%=4 TO 6 S
TEP 2
  780 P%=0:O%=code%
  790 [OPT pass%
  800 .module
  810 EQUD 0
  820 EQUD initmod
  830 EQUD quitmod
  840 EQUD 0
  850 EQUD title
  860 EQUD help
  870 EQUD commandtable
  880 EQUD 0:EQUD 0
  890 EQUD 0:EQUD 0
  900 :
  910 .title
  920 FNz("MFS")
  930 .help
  940 FNz("MFS"+CHR$(9)+
CHR$(9)+"1.00 ("+MID$(TI
ME$,5,11)+")")
  950 :
  960 .initmod
  970 STMFD (sp)!,{link}
  980 MOV R0,#12
  990 ADR R1,module
 1000 MOV R2,#fsinfo-mod
ule
 1010 MOV R3,#0
 1020 SWI "OS_FSControl"
 1030 LDMFD (sp)!,{pc}
 1040 :
 1050 .quitmod
 1060 STMFD (sp)!,{link}
 1070 MOV R0,#16
 1080 ADR R1,fsname
 1090 SWI "OS_FSControl"
 1100 LDMFD (sp)!,{pc}
 1110 :
 1120 .commandtable
 1130 FNz("MFS")
 1140 EQUD selectfs
 1150 EQUD 0
 1160 EQUD selsyn
 1170 EQUD selhelp
 1180 EQUD 0
 1190 :
 1200 .selectfs
 1210 STMFD (sp)!,{link}
 1220 MOV R0,#14
 1230 MOV R1,#42
 1240 SWI "OS_FSControl"
 1250 LDMFD (sp)!,{pc}
 1260 :
 1270 .selhelp
 1280 EQUS "*MFS selects
 the module filing syste
m."
 1290 EQUB 13
 1300 .selsyn
 1310 FNz("Syntax: *MFS"
)
 1320 :
 1330 .fsinfo
 1340 EQUD fsname
 1350 EQUD fsstarttext
 1360 EQUD badop
 1370 EQUD badop
 1380 EQUD badop
 1390 EQUD badop
 1400 EQUD badop
 1410 EQUD fsentryfile
 1420 EQUD 42
 1430 EQUD fsentryfunc
 1440 EQUD badop
 1450 :
 1460 .fsname
 1470 FNz("MFS")
 1480 .fsstarttext
 1490 FNz("Module Filing
 System")
 1500 .badop
 1510 ADR R0,notsupporte
d
 1520 ORRS pc,link,#vbit
 1530 .fsentryfile
 1540 CMP R0,#255
 1550 BEQ loadfile
 1560 CMP R0,#5
 1570 BNE badop
 1580 STMFD (sp)!,{R12,l
ink}
 1590 BL findfile
 1600 MOVCS R0,#0
 1610 LDMCSFD (sp)!,{R12
,pc}
 1620 MOV R0,#1
 1630 ADR R2,loads
 1640 LDR R2,[R2,R12,ASL
 #2]
 1650 ADR R3,execs
 1660 LDR R3,[R3,R12,ASL
 #2]
 1670 ADR R4,sizes
 1680 LDR R4,[R4,R12,ASL
 #2]
 1690 MOV R5,#%00011001
 1700 LDMFD (sp)!,{R12,p
c}
 1710 .loadfile
 1720 STMFD (sp)!,{R12,l
ink}
 1730 BL findfile
 1740 ADRCS R0,notfound
 1750 LDMCSFD (sp)!,{R12
,link}
 1760 ORRCSS pc,link,#vb
it
 1770 TST R3,#%11111111
 1780 ADRNE R2,loads
 1790 LDRNE R2,[R2,R12,A
SL #2]
 1800 ADR R4,sizes
 1810 LDR R4,[R4,R12,ASL
 #2]
 1820 ADR R0,filenames
 1830 ADR R5,startaddrs
 1840 LDR R5,[R5,R12,ASL
 #2]
 1850 ADD R5,R5,R0
 1860 .loadloop
 1870 CMP R4,#0
 1880 BEQ loaded
 1890 SUB R4,R4,#1
 1900 LDRB R0,[R5,R4]
 1910 STRB R0,[R2,R4]
 1920 B loadloop
 1930 .loaded
 1940 ADR R3,execs
 1950 LDR R3,[R3,R12,ASL
 #2]
 1960 ADR R4,sizes
 1970 LDR R4,[R4,R12,ASL
 #2]
 1980 MOV R5,#%00011001
 1990 LDMFD (sp)!,{R12,p
c}
 2000 .fsentryfunc
 2010 CMP R0,#2
 2020 BNE badop
 2030 STMFD (sp)!,{R0,R8
,link}
 2040 ADR R8,filenames
 2050 .catloop1
 2060 LDRB R0,[R8]
 2070 CMP R0,#0
 2080 LDMEQFD (sp)!,{R0,
R8,pc}
 2090 .catloop2
 2100 LDRB R0,[R8],#1
 2110 SWI "OS_WriteC"
 2120 CMP R0,#13
 2130 BNE catloop2
 2140 SWI "OS_NewLine"
 2150 B catloop1
 2160 :
 2170 .findfile
 2180 STMFD (sp)!,{R0,R8
,R9,R10,link}
 2190 ADR R8,filenames
 2200 MOV R12,#0
 2210 .ffloop1
 2220 MOV R6,R8
 2230 LDRB R0,[R8]
 2240 CMP R0,#0
 2250 LDMEQFD (sp)!,{R0,
R8,R9,R10,link}
 2260 ORREQS pc,link,#cb
it
 2270 MOV R9,R1
 2280 .ffloop2
 2290 LDRB R0,[R8]
 2300 LDRB R10,[R9],#1
 2310 CMP R0,#13
 2320 BNE notdoneff
 2330 CMP R10,#32
 2340 BGT nextplease
 2350 LDMFD (sp)!,{R0,R8
,R9,R10,pc}
 2360 .notdoneff
 2370 AND R0,R0,#&DF
 2380 AND R10,R10,#&DF
 2390 CMP R0,R10
 2400 BNE nextplease
 2410 ADD R8,R8,#1
 2420 B ffloop2
 2430 .nextplease
 2440 LDRB R0,[R8],#1
 2450 CMP R0,#13
 2460 BNE nextplease
 2470 ADD R12,R12,#1
 2480 B ffloop1
 2490 :
 2500 .notsupported
 2510 EQUD 0
 2520 FNz("Not supported
 by MFS")
 2530 .notfound
```

Continued ▶

LANDSCAPES

◀ Arc Agora, Listing 1 continued

```
2540 EQUD 0
2550 FNz("Not found")
2560 ]
2570 startaddrs=P%
2580 FOR n=0 TO num-1
2590 [OPT pass%:EQUD st
art(n):]
2600 NEXT n
2610 sizes=P%
2620 FOR n=0 TO num-1
2630 [OPT pass%:EQUD si
ze(n):]
2640 NEXT n
2650 loads=P%
2660 FOR n=0 TO num-1
2670 [OPT pass%:EQUD lo
ad(n):]
2680 NEXT n
2690 execs=P%
2700 FOR n=0 TO num-1
2710 [OPT pass%:EQUD ex
ec(n):]
2720 NEXT n
2730 filenames=P%
2740 FOR n=0 TO num-1
2750 [OPT pass%:EQUS na
me$(n):EQUB 13:]
2760 NEXT n
2770 [OPT pass%:EQUD 0:
]
2780 FOR n=0 TO num-1
2790 start(n)=P%-filena
mes
2800 IF pass%=6 SYS "OS
_File",255,file$(n),0%
2810 P%+=size(n):0%+=si
ze(n)
2820 NEXT n
2830 NEXT pass%
2840 PROCins("MFSmod")
2850 INPUT "Save module
as: "final$
2860 SYS "OS_File",10,f
inal$,&FFA,,code%,0%
2870 PRINT "MFS module
saved as '"final$"'"
2880 END
2890 :
2900 DEF FNz(data$)
2910 [OPT pass%
2920 EQUS data$
2930 EQUB 0
2940 ALIGN
2950 ]
2960 =0
2970 :
2980 DEF PROCins(i$)
2990 FOR i=1 TO LEN(i$)
3000 SYS "OS_Byte",138,
0,ASCMID$(i$,i)
3010 NEXT
3020 ENDPROC
```

Listing 2. Date format

```
10 REM >Agora2
20 REM Make-a-date
30 REM by Patrick Griffin
40 REM for Archimedes only
50 REM (c) BAU September 1989
60 :
70 MODE 14
80 OFF
90 len%=50
100 DIM block 5,stringbuffer len%
110 REPEAT
120 VDU 31,0,9
130 COLOUR 2:PRINT FNformat("Today is
%we the %zdy%st of %mo %ce%yr%0")
140 COLOUR 6:PRINT FNformat("U.K. date
: %zdy/%zmn/%yr%0")
150 COLOUR 2:PRINT FNformat("U.S.A. da
te: %zmn/%zdy/%yr%0")
160 COLOUR 6:PRINT FNformat("Day of th
e year: %zdn%0")
170 COLOUR 2:PRINT FNformat("Week numb
er: %zwk (Mon to Sun)%0")
180 COLOUR 6:PRINT FNformat("12 hour c
lock: %z12:%mi:%se %am%0")
190 COLOUR 2:PRINT FNformat("24 hour c
lock: %24:%mi:%se%0")
200 UNTIL FALSE
210 END
220 :
230 DEF FNformat(format$)
240 ?block=3
250 string$=""
260 SYS "OS_Word",14,block
270 SYS "OS_ConvertDateAndTime",block,
stringbuffer,len%,format$ TO ,end%
280 string%=end%-stringbuffer-2
290 FOR byte%=0 TO string%
300 string$+=CHR$(stringbuffer?byte%)
310 NEXT
320 string$+=STRING$(6," ")
330 =string$
```

Listing 3. Using the hourglass

```
10 REM >Agora3
20 REM Hourglass Demo
30 REM by Iain Oglesby
40 REM for Archimedes only
50 REM (c) BAU September 1989
60 :
70 OSCLI("Pointer")
80 SYS "Hourglass_On"
90 FOR loop=1 TO 100
100 SYS "Hourglass_Percentage",loop
110 REM Put your own code in here -
120 REM we'll just wait a little...
130 WAIT
140 NEXT loop
150 SYS "Hourglass_Off"
160 END
```

Listing 4. One line game

```
10MODE2:OFF:TIME=0:A=
1263:B=400:Y=B:REPEAT:VD
U23,7,1,1,1¦:MOVEA,0:H=R
ND(99)+B:DRAWA,H:MOVEA,H
+300-TIME DIV9:DRAWA,102
3:C=POINT(8,Y):POINT8,Y:
B+=(RND(40)-RND(40))*-(B
<900)AND(B>0):Y+=8*INKEY
-42-8*INKEY-58:SOUND1,-1
,99,9:UNTILC:SOUND1,-12,
150,99:CLS:PRINTTIME
```

See Lie of the Land, page 57

Listing 1. Archimedes landscape

```
10 REM >ArcScape
20 REM By David Lawrence
30 REM For Archimedes Only
40 REM (C) BBC Acorn User Sep 1989
50 :
60 MODE 13:OFF
70 PROCinit
80 PROCfaults(faults)
90 PROClevels
100 PROCdraw
110 END
120 :
130 DEF PROCinit
140 size%    = 80
150 xscale%  = 8
160 yscale%  = 4
170 zscale%  = 4
180 circular = TRUE
190 linear   = FALSE
200 faults   = 100
210 delta    = 3
220 :
230 DIM land(size%,size%)
240 DIM s%(2),x%(2),y%(2),height(3)
250 DIM gcol%(23),tint%(23)
260 :
270 CASE MODE OF
280 WHEN 13,15,21 : colours=256
290 OTHERWISE : colours=16
300 ENDCASE
310 :
320 IF colours=256 THEN
330 shades=23
340 yellow=%001111
350 FOR i%=0 TO 11
360 col=(i% DIV 4)+1
370 tint%(i%)=(i% MOD 4)<<6
380 gcol%(i%)=col<<2
390 tint%(i%+12)=tint%(i%)
400 gcol%(i%+12)=(col<<4)+(3<<2)+col
410 NEXT
420 ELSE
430 shades=12
440 FOR i%=0 TO 15
450 READ r%,g%,b%
460 COLOUR i%,r%,g%,b%
470 NEXT
480 COLOUR 15
490 ENDIF
500 ENDPROC
510 :
520 DEF PROCfaults(num%)
530 FOR i%=1 TO num%
540 PRINT TAB(0,0);"Faults left:";num%
-i%;" "
550 IF circular PROCcircle
560 IF linear PROCline
570 NEXT
580 ENDPROC
590 :
600 DEF PROCcircle
610 x%=RND(size%)-1
620 y%=RND(size%)-1
630 r%=(RND(size%)-1)^2
640 add=SGNRND*RND(1)*delta
650 FOR X%=0 TO size%
660 dx=(X%-x%)^2
670 IF dx<r% THEN
680 dy=SQR(r%-dx)
690 y1=y%-dy
700 y2=y%+dy
710 IF y1<0 y1=0
720 IF y2>=size% y2=size%-1
730 FOR Y%=y1 TO y2
740 land(X%,Y%)+=add
750 NEXT
760 ENDIF
770 NEXT
780 ENDPROC
790 :
800 DEF PROCline
810 REPEAT
820 s%(1)=RND(4):s%(2)=RND(4)
830 UNTIL s%(1)<>s%(2)
```

Continued ▶

◀ Lie of the Land. Listing 1 continued

```
840 REPEAT
850 FOR J%=1 TO 2
860 CASE s%(J%) OF
870 WHEN 1:
880 x%(J%)=0
890 y%(J%)=RND(size%)-1
900 WHEN 2:
910 x%(J%)=RND(size%)-1
920 y%(J%)=size%
930 WHEN 3:
940 x%(J%)=size%
950 y%(J%)=RND(size%)-1
960 WHEN 4:
970 x%(J%)=RND(size%)-1
980 y%(J%)=0
990 ENDCASE
1000 NEXT
1010 UNTIL x%(1)<>x%(2) AND y%(1)<>y%(2
)
1020 M=(y%(2)-y%(1))/(x%(2)-x%(1))
1030 C=y%(1)-M*x%(1)
1040 add=SGNRND*RND(1)*delta
1050 FOR X%=0 TO size%
1060 Y%=M*X%+C
1070 IF Y%<0 Y%=0
1080 IF Y%<=size% THEN
1090 FOR y%=Y% TO size%
1100 land(X%,y%)+=add
1110 NEXT
1120 ENDIF
1130 NEXT
1140 ENDPROC
1150 :
1160 DEF PROClevels
1170 base=0
1180 peak=0
1190 land(size%,size%)=land(size%-1,siz
e%-1)
1200 FOR X%=0 TO size%-1
1210 land(X%,size%)=land(X%,size%-1)
1220 land(size%,X%)=land(size%-1,X%)
1230 FOR Y%=0 TO size%-1
1240 av=(land(X%,Y%)+land(X%+1,Y%)+land
(X%,Y%+1)+land(X%+1,Y%+1))/4
1250 IF av<base base=av
1260 IF av>peak peak=av
1270 NEXT
1280 NEXT
1290 water=(SUM land())/(size%*size%)
1300 range=(peak-water)/shades
1310 depth=(water-base)/12
1320 ENDPROC
1330 :
1340 DEF PROCdraw
1350 CLS
1360 FOR I%=0 TO size%-1
1370 FOR J%=0 TO size%-1
1380 PROCpatch(I%,J%)
1390 IF I%=size%-1 PROCside(col%)
1400 NEXT
1410 PROCedge(col%)
1420 NEXT
1430 PROCblack
1440 PROC3d(4,size%,size%,water)
1450 PROC3d(5,size%,size%,base)
1460 PROC3dd(5,size%,size%)
1470 ENDPROC
1480 :
1490 DEF PROCpatch(X%,Y%)
1500 height(0)=land(X%,Y%)-water
1510 height(1)=land(X%+1,Y%)-water
1520 height(2)=land(X%+1,Y%+1)-water
1530 height(3)=land(X%,Y%+1)-water
1540 av%=(SUM height())/4
1550 col%=av%/range
1560 sea%=av%/depth
1570 IF col%<0 col%=0
1580 IF sea%>0 sea%=0
1590 F$="FN"
1600 FOR i%=0 TO 3
1610 IF height(i%)<0 THEN
1620 F$+="b"
1630 ELSE
1640 F$+="a"
1650 ENDIF
1660 NEXT
1670 PROCsea(sea%+11)
1680 PROCgreen(col%)
1690 null=EVAL(F$)
1700 ENDPROC
1710 :
1720 DEF PROCedge(col%)
1730 PROCblue(0)
1740 PROC3d(4,I%,size%,base)
1750 PROC3d(4,I%+1,size%,base)
1760 PROC3d(85,I%,size%,water)
1770 PROC3d(85,I%+1,size%,water)
1780 PROCblack
1790 PROC3d(5,I%,size%,water)
1800 PROCgreen(0)
1810 PROC3d(4,I%,size%,base)
1820 PROC3d(4,I%+1,size%,base)
1830 PROC3dd(85,I%,size%)
1840 PROC3dd(85,I%+1,size%)
1850 PROCblack
1860 PROC3dd(5,I%,size%)
1870 ENDPROC
1880 :
1890 DEF PROCside(col%)
1900 PROCblue(0)
1910 PROC3d(4,size%,J%,base)
1920 PROC3d(4,size%,J%+1,base)
1930 PROC3d(85,size%,J%,water)
1940 PROC3d(85,size%,J%+1,water)
1950 PROCblack
1960 PROC3d(5,size%,J%,water)
1970 PROCgreen(0)
1980 PROC3d(4,size%,J%,base)
1990 PROC3d(4,size%,J%+1,base)
2000 PROC3dd(85,size%,J%)
2010 PROC3dd(85,size%,J%+1)
2020 PROCblack
2030 PROC3dd(5,size%,J%)
2040 ENDPROC
2050 :
2060 DEF PROCsea(col%)
2070 PROCblue(col%)
2080 PROC3d(4,X%,Y%,water)
2090 PROC3d(4,X%+1,Y%,water)
2100 PROC3d(85,X%,Y%+1,water)
2110 PROC3d(85,X%+1,Y%+1,water)
2120 ENDPROC
2130 :
2140 DEF FNaaaa
2150 PROC3dd(4,X%,Y%)
2160 PROC3dd(4,X%+1,Y%)
2170 PROC3dd(85,X%,Y%+1)
2180 PROC3dd(85,X%+1,Y%+1)
2190 =0
2200 :
2210 DEF FNaaab
2220 PROC3dd(4,X%,Y%)
2230 PROC3dd(4,X%+1,Y%)
2240 PROC3dm(85,3)
2250 PROC3dd(85,X%+1,Y%+1)
2260 PROC3dm(85,2)
2270 PROCyellow
2280 PROC3dm(5,3)
2290 =0
2300 :
2310 DEF FNaaba
2320 PROC3dd(4,X%,Y%)
2330 PROC3dd(4,X%,Y%+1)
2340 PROC3dd(85,X%+1,Y%)
2350 PROC3dm(85,2)
2360 PROC3dm(85,1)
2370 PROCyellow
2380 PROC3dm(5,2)
2390 =0
2400 :
2410 DEF FNaabb
2420 PROC3dd(4,X%,Y%)
2430 PROC3dd(4,X%+1,Y%)
2440 PROC3dm(85,3)
2450 PROC3dm(85,1)
2460 PROCyellow
2470 PROC3dm(5,3)
2480 =0
2490 :
2500 DEF FNabaa
2510 PROC3dd(4,X%,Y%+1)
2520 PROC3dd(4,X%+1,Y%+1)
2530 PROC3dd(85,X%,Y%)
2540 PROC3dm(85,1)
2550 PROC3dm(85,0)
2560 PROCyellow
2570 PROC3dm(5,1)
2580 =0
2590 :
2600 DEF FNabab
2610 PROCtri(0)
2620 PROCgreen(col%)
2630 PROCtri(2)
2640 =0
2650 :
2660 DEF FNabba
2670 PROC3dd(4,X%,Y%)
2680 PROC3dd(4,X%,Y%+1)
2690 PROC3dm(85,0)
2700 PROC3dm(85,2)
2710 PROCyellow
2720 PROC3dm(5,0)
2730 =0
2740 :
2750 DEF FNabbb
2760 PROCtri(0)
2770 =0
2780 :
2790 DEF FNbaaa
2800 PROC3dm(4,3)
2810 PROC3dm(4,0)
2820 PROC3dd(85,X%,Y%+1)
2830 PROC3dd(85,X%+1,Y%)
2840 PROC3dd(85,X%+1,Y%+1)
2850 =0
2860 :
2870 DEF FNbaab
2880 PROC3dd(4,X%+1,Y%+1)
2890 PROC3dd(4,X%+1,Y%)
2900 PROC3dm(85,2)
2910 PROC3dm(85,0)
2920 PROCyellow
2930 PROC3dm(85,2)
2940 =0
2950 :
2960 DEF FNbaba
2970 PROCtri(1)
2980 PROCgreen(col%)
2990 PROCtri(3)
3000 =0
3010 :
3020 DEF FNbabb
3030 PROCtri(1)
3040 =0
3050 :
3060 DEF FNbbaa
3070 PROC3dd(4,X%+1,Y%+1)
3080 PROC3dd(4,X%,Y%+1)
3090 PROC3dm(85,1)
3100 PROC3dm(85,3)
3110 PROCyellow
3120 PROC3dm(5,1)
3130 =0
3140 :
3150 DEF FNbbab
3160 PROCtri(2)
3170 =0
3180 :
3190 DEF FNbbba
3200 PROCtri(3)
3210 =0
3220 :
3230 DEF FNbbbb
3240 =0
3250 :
3260 DEF PROCtri(t%)
3270 CASE t% OF
3280 WHEN 0:
3290 PROCtat(X%,Y%,3,0)
3300 WHEN 1:
3310 PROCtat(X%+1,Y%,0,1)
3320 WHEN 2:
3330 PROCtat(X%+1,Y%+1,1,2)
3340 WHEN 3:
3350 PROCtat(X%,Y%+1,2,3)
3360 ENDCASE
3370 ENDPROC
3380 :
3390 DEF PROCtat(x%,y%,s1%,s2%)
3400 PROC3dd(4,x%,y%)
3410 PROC3dm(4,s1%)
3420 PROC3dm(85,s2%)
3430 PROCyellow
3440 PROC3dm(5,s1%)
3450 ENDPROC
3460 :
3470 DEF PROC3dm(o%,s%)
3480 CASE s% OF
3490 WHEN 0:
3500 PROCmid(o%,X%,Y%,1,0,0,1)
3510 WHEN 1:
3520 PROCmid(o%,X%+1,Y%,0,1,1,2)
3530 WHEN 2:
3540 PROCmid(o%,X%,Y%+1,1,0,3,2)
3550 WHEN 3:
3560 PROCmid(o%,X%,Y%,0,1,0,3)
3570 ENDCASE
3580 ENDPROC
3590 :
3600 DEF PROCmid(o%,xs,ys,xa,ya,zs,ze)
3610 d=height(zs)/(height(zs)-height(ze
))
3620 IF xa THEN
3630 PROC3d(o%,xs+d*xa,ys,water)
3640 ELSE
3650 PROC3d(o%,xs,ys+d*ya,water)
3660 ENDIF
3670 ENDPROC
3680 :
3690 DEF PROC3dd(o%,X,Y)
3700 PROC3d(o%,X,Y,land(X,Y))
3710 ENDPROC
3720 :
3730 DEF PROC3d(o%,X,Y,Z)
3740 PLOT o%,640+(X-Y)*xscale%,850-(X+Y
)*yscale%+Z*zscale%
3750 ENDPROC
3760 :
3770 DEF PROCblack
3780 GCOL 0 TINT 0
3790 ENDPROC
3800 :
3810 DEF PROCblue(level%)
3820 IF colours=256 THEN
3830 GCOL ((level% DIV 4)+1)<<4 TINT ((
level% AND 3)<<6)
3840 ELSE
3850 GCOL 1
3860 ENDIF
3870 ENDPROC
3880 :
3890 DEF PROCyellow
3900 IF colours=256 THEN
3910 GCOL yellow TINT 192
3920 ELSE
3930 GCOL 2
3940 ENDIF
3950 ENDPROC
3960 :
3970 DEF PROCgreen(level%)
3980 IF colours=256 THEN
3990 GCOL gcol%(level%) TINT tint%(leve
l%)
4000 ELSE
4010 GCOL 3+level%
4020 ENDIF
4030 ENDPROC
4040 :
4050 DATA &00,&00,&00, &10,&20,&90, &F0
,&E0,&10, &00,&30,&00
4060 DATA &00,&40,&00, &00,&50,&00, &00
,&60,&00, &00,&70,&00
4070 DATA &00,&80,&00, &00,&90,&00, &20
,&A0,&20, &40,&B0,&40
4080 DATA &60,&C0,&60, &90,&D0,&90, &D0
,&E0,&D0, &F0,&F0,&F0
```

LANDSCAPES

Listing 2. BBC landscape

```
  10 REM >BBCScape
  20 REM By David Lawrence
  30 REM For BBC B/B+/M/C/E/A
  40 REM (C) BBC Acorn User Sep 1989
  50 :
  60 MODE 1:VDU 23;8202;0;0;0;
  70 PROCinit
  80 PROCfaults(faults)
  90 PROClevels
 100 PROCdraw
 110 END
 120 :
 130 DEF PROCinit
 140 size%    = 10
 150 xscale%  = 64
 160 yscale%  = 32
 170 zscale%  = 4
 180 circular = TRUE
 190 linear   = FALSE
 200 faults   = 50
 210 delta    = 3
 220 :
 230 DIM land(size%,size%)
 240 DIM s%(2),x%(2),y%(2),height(3)
 250 VDU 19,3,4;0;
 260 black=0
 270 blue=3
 280 ENDPROC
 290 :
 300 DEF PROCfaults(num%)
 310 FOR i%=1 TO num%
 320 PRINT TAB(0,0);"Faults left:";num%-i%;" "
 330 IF circular PROCcircle
 340 IF linear PROCline
 350 NEXT
 360 ENDPROC
 370 :
 380 DEF PROCcircle
 390 x%=RND(size%)-1
 400 y%=RND(size%)-1
 410 r%=(RND(size%)-1)^2
 420 add=SGNRND*RND(1)*delta
 430 FOR X%=0 TO size%
 440 dx=(X%-x%)^2
 450 IF dx<r% PROCdocirc
 460 NEXT
 470 ENDPROC
 480 :
 490 DEF PROCdocirc
 500 dy=SQR(r%-dx)
 510 y1=y%-dy
 520 y2=y%+dy
 530 IF y1<0 y1=0
 540 IF y2>=size% y2=size%-1
 550 FOR Y%=y1 TO y2
 560 land(X%,Y%)=land(X%,Y%)+add
 570 NEXT
 580 ENDPROC
 590 :
 600 DEF PROCline
 610 REPEAT
 620 s%(1)=RND(4):s%(2)=RND(4)
 630 UNTIL s%(1)<>s%(2)
 640 REPEAT
 650 FOR J%=1 TO 2
 660 IF s%(J%)=1 x%(J%)=0:y%(J%)=RND(size%)-1
 670 IF s%(J%)=2 x%(J%)=RND(size%)-1:y%(J%)=size%
 680 IF s%(J%)=3 x%(J%)=size%:y%(J%)=RND(size%)-1
 690 IF s%(J%)=4 x%(J%)=RND(size%)-1:y%(J%)=0
 700 NEXT
 710 UNTIL x%(1)<>x%(2) AND y%(1)<>y%(2)
 720 M=(y%(2)-y%(1))/(x%(2)-x%(1))
 730 C=y%(1)-M*x%(1)
 740 add=SGNRND*RND(1)*delta
 750 FOR X%=0 TO size%
 760 Y%=M*X%+C
 770 IF Y%<0 Y%=0
 780 IF Y%<=size% PROCdoline
 790 NEXT
 800 ENDPROC
 810 :
 820 DEF PROCdoline
 830 FOR y%=Y% TO size%
 840 land(X%,y%)=land(X%,y%)+add
 850 NEXT
 860 ENDPROC
 870 :
 880 DEF PROClevels
 890 base=0
 900 peak=0
 910 aver=0
 920 land(size%,size%)=land(size%-1,size%-1)
 930 FOR X%=0 TO size%-1
 940 land(X%,size%)=land(X%,size%-1)
 950 land(size%,X%)=land(size%-1,X%)
 960 aver=aver+land(X%,size%)+land(size%,X%)
 970 FOR Y%=0 TO size%-1
 980 aver=aver+land(X%,Y%)
 990 av=(land(X%,Y%)+land(X%+1,Y%)+land(X%,Y%+1)+land(X%+1,Y%+1))/4
1000 IF av<base base=av
1010 IF av>peak peak=av
1020 NEXT
1030 NEXT
1040 water=aver/(size%*size%)
1050 ENDPROC
1060 :
1070 DEF PROCdraw
1080 CLS
1090 col%=1
1100 FOR I%=0 TO size%-1
1110 FOR J%=0 TO size%-1
1120 PROCpatch(I%,J%)
1130 IF I%=size%-1 PROCside(col%)
1140 col%=3-col%
1150 NEXT
1160 col%=3-col%
1170 PROCedge(col%)
1180 NEXT
1190 GCOL 0,0
1200 PROC3d(4,size%,size%,water)
1210 PROC3d(5,size%,size%,base)
1220 PROC3dd(5,size%,size%)
1230 ENDPROC
1240 :
1250 DEF PROCpatch(X%,Y%)
1260 height(0)=land(X%,Y%)-water
1270 height(1)=land(X%+1,Y%)-water
1280 height(2)=land(X%+1,Y%+1)-water
1290 height(3)=land(X%,Y%+1)-water
1300 F$="FN"
1310 FOR i%=0 TO 3
1320 IF height(i%)<0 F$=F$+"b" ELSE F$=F$+"a"
1330 NEXT
1340 PROCsea
1350 GCOL 0,col%
1360 null=EVAL(F$)
1370 ENDPROC
1380 :
1390 DEF PROCedge(col%)
1400 GCOL 0,blue
1410 PROC3d(4,I%,size%,base)
1420 PROC3d(4,I%+1,size%,base)
1430 PROC3d(85,I%,size%,water)
1440 PROC3d(85,I%+1,size%,water)
1450 GCOL 0,black
1460 PROC3d(5,I%,size%,water)
1470 GCOL 0,col%
1480 PROC3d(4,I%,size%,base)
1490 PROC3d(4,I%+1,size%,base)
1500 PROC3dd(85,I%,size%)
1510 PROC3dd(85,I%+1,size%)
1520 GCOL 0,0
1530 PROC3dd(5,I%,size%)
1540 ENDPROC
1550 :
1560 DEF PROCside(col%)
1570 GCOL 0,blue
1580 PROC3d(4,size%,J%,base)
1590 PROC3d(4,size%,J%+1,base)
1600 PROC3d(85,size%,J%,water)
1610 PROC3d(85,size%,J%+1,water)
1620 GCOL 0,0
1630 PROC3d(5,size%,J%,water)
1640 GCOL 0,col%
1650 PROC3d(4,size%,J%,base)
1660 PROC3d(4,size%,J%+1,base)
1670 PROC3dd(85,size%,J%)
1680 PROC3dd(85,size%,J%+1)
1690 GCOL 0,0
1700 PROC3dd(5,size%,J%)
1710 ENDPROC
1720 :
1730 DEF PROCsea
1740 GCOL 0,blue
1750 PROC3d(4,X%,Y%,water)
1760 PROC3d(4,X%+1,Y%,water)
1770 PROC3d(85,X%,Y%+1,water)
1780 PROC3d(85,X%+1,Y%+1,water)
1790 ENDPROC
1800 :
1810 DEF FNaaaa
1820 PROC3dd(4,X%,Y%)
1830 PROC3dd(4,X%+1,Y%)
1840 PROC3dd(85,X%,Y%+1)
1850 PROC3dd(85,X%+1,Y%+1)
1860 GCOL 0,black
1870 PROC3dd(5,X%+1,Y%)
1880 PROC3dd(5,X%,Y%)
1890 PROC3dd(5,X%,Y%+1)
1900 PROC3dd(5,X%+1,Y%+1)
1910 =0
1920 :
1930 DEF FNaaab
1940 PROC3dd(4,X%,Y%)
1950 PROC3dd(4,X%+1,Y%)
1960 PROC3dm(85,3)
1970 PROC3dd(85,X%+1,Y%+1)
1980 PROC3dm(85,2)
1990 GCOL 0,black
2000 PROC3dm(5,3)
2010 PROC3dd(5,X%,Y%)
2020 PROC3dd(5,X%+1,Y%)
2030 PROC3dd(5,X%+1,Y%+1)
2040 PROC3dm(5,2)
2050 =0
2060 :
2070 DEF FNaaba
2080 PROC3dd(4,X%,Y%)
2090 PROC3dd(4,X%,Y%+1)
2100 PROC3dd(85,X%+1,Y%)
2110 PROC3dm(85,2)
2120 PROC3dm(85,1)
2130 GCOL 0,black
2140 PROC3dm(5,2)
2150 PROC3dd(5,X%,Y%+1)
2160 PROC3dd(5,X%,Y%)
2170 PROC3dd(5,X%+1,Y%)
2180 PROC3dm(5,1)
2190 =0
2200 :
2210 DEF FNaabb
2220 PROC3dd(4,X%,Y%)
2230 PROC3dd(4,X%+1,Y%)
2240 PROC3dm(85,3)
2250 PROC3dm(85,1)
2260 GCOL 0,black
2270 PROC3dm(5,3)
2280 PROC3dd(5,X%,Y%)
2290 PROC3dd(5,X%+1,Y%)
2300 PROC3dm(5,1)
2310 =0
2320 :
2330 DEF FNabaa
2340 PROC3dd(4,X%,Y%+1)
2350 PROC3dd(4,X%+1,Y%+1)
2360 PROC3dd(85,X%,Y%)
2370 PROC3dm(85,1)
2380 PROC3dm(85,0)
2390 GCOL 0,black
2400 PROC3dm(5,1)
2410 PROC3dd(5,X%+1,Y%+1)
2420 PROC3dd(5,X%,Y%+1)
2430 PROC3dd(5,X%,Y%)
2440 PROC3dm(5,0)
2450 =0
2460 :
2470 DEF FNabab
2480 PROCtri(0)
2490 GCOL 0,col%
2500 PROCtri(2)
2510 =0
2520 :
2530 DEF FNabba
2540 PROC3dd(4,X%,Y%)
2550 PROC3dd(4,X%,Y%+1)
2560 PROC3dm(85,0)
2570 PROC3dm(85,2)
2580 GCOL 0,black
2590 PROC3dd(5,X%,Y%+1)
2600 PROC3dd(5,X%,Y%)
2610 PROC3dm(5,0)
2620 PROC3dm(5,2)
2630 =0
2640 :
2650 DEF FNabbb
2660 PROCtri(0)
2670 =0
2680 :
2690 DEF FNbaaa
2700 PROC3dm(4,3)
2710 PROC3dm(4,0)
2720 PROC3dd(85,X%,Y%+1)
2730 PROC3dd(85,X%+1,Y%)
2740 PROC3dd(85,X%+1,Y%+1)
2750 GCOL 0,black
2760 PROC3dd(5,X%,Y%+1)
2770 PROC3dm(5,3)
2780 PROC3dm(5,0)
2790 PROC3dd(5,X%+1,Y%)
2800 PROC3dd(5,X%+1,Y%+1)
2810 =0
2820 :
2830 DEF FNbaab
2840 PROC3dd(4,X%+1,Y%+1)
2850 PROC3dd(4,X%+1,Y%)
2860 PROC3dm(85,2)
2870 PROC3dm(85,0)
2880 GCOL 0,black
2890 PROC3dm(5,2)
2900 PROC3dd(5,X%+1,Y%+1)
2910 PROC3dd(5,X%+1,Y%)
2920 PROC3dm(5,0)
2930 =0
2940 :
2950 DEF FNbaba
2960 PROCtri(1)
2970 GCOL 0,col%
2980 PROCtri(3)
2990 =0
3000 :
3010 DEF FNbabb
3020 PROCtri(1)
3030 =0
3040 :
3050 DEF FNbbaa
3060 PROC3dd(4,X%+1,Y%+1)
3070 PROC3dd(4,X%,Y%+1)
3080 PROC3dm(85,1)
3090 PROC3dm(85,3)
3100 GCOL 0,black
3110 PROC3dm(5,1)
3120 PROC3dd(5,X%+1,Y%+1)
3130 PROC3dd(5,X%,Y%+1)
3140 PROC3dm(5,3)
3150 =0
3160 :
3170 DEF FNbbab
3180 PROCtri(2)
3190 =0
3200 :
3210 DEF FNbbba
3220 PROCtri(3)
3230 =0
3240 :
3250 DEF FNbbbb
3260 =0
3270 :
3280 DEF PROCtat(x%,y%,s1%,s2%)
3290 PROC3dd(4,x%,y%)
3300 PROC3dm(4,s1%)
3310 PROC3dm(85,s2%)
3320 GCOL 0,black
```

Continued ▶

POSTSCRIPT

◀ Lie of fthe Land. Listing 2 continued

```
3330 PROC3dm(5,s1%)
3340 PROC3dd(5,x%,y%)
3350 PROC3dm(5,s2%)
3360 ENDPROC
3370 :
3380 DEF PROCtri(t%)
3390 IF t%=0 PROCtat(X%,Y%,3,0)
3400 IF t%=1 PROCtat(X%+1,Y%,0,1)
3410 IF t%=2 PROCtat(X%+1,Y%+1,1,2)
3420 IF t%=3 PROCtat(X%,Y%+1,2,3)
3430 ENDPROC
3440 :
3450 DEF PROC3dm(o%,s%)
3460 IF s%=0 PROCmid(o%,X%,Y%,1,0,0,1)
3470 IF s%=1 PROCmid(o%,X%+1,Y%,0,1,1,2
)
3480 IF s%=2 PROCmid(o%,X%,Y%+1,1,0,3,2
)
3490 IF s%=3 PROCmid(o%,X%,Y%,0,1,0,3)
3500 ENDPROC
3510 :
3520 DEF PROCmid(o%,xs,ys,xa,ya,zs,ze)
3530 d=height(zs)/(height(zs)-height(ze
))
3540 IF xa PROC3d(o%,xs+d*xa,ys,water)
ELSE PROC3d(o%,xs,ys+d*ya,water)
3550 ENDPROC
3560 :
3570 DEF PROC3dd(o%,X,Y)
3580 PROC3d(o%,X,Y,land(X,Y))
3590 ENDPROC
3600 :
3610 DEF PROC3d(o%,X,Y,Z)
3620 PLOT o%,640+(X-Y)*xscale%,850-(X+Y
)*yscale%+Z*zscale%
3630 ENDPROC
```

See In the Post, page 73

```
10 REM Spool file to PostScript
20 REM by David Atherton
30 REM for B/B+/E/M/C/A
40 REM (c) Acorn User Aug 89
50 :
60 txtsize=26.5
70 view%=FALSE
80 vdu4%=TRUE
90 op%=1
100 maxc%=1
110 x%=0:y%=0:x1%=0:y1%=0
120 st$=" gsave stroke grestore "
130 CLOSE #0
140 PRINT "VDU to PostScript Converter
"
150 INPUT "Name of spooled VDU file
   : " V$
160 INPUT "Name of PS file (or SCR or
PRN) : " P$
170 IF P$="PRN" OR P$="SCR" THEN op%=0
180 IF op% THEN op%=OPENOUT P$
190 PROCinit
200 X%=OPENIN V$
210 :
220 REPEAT
230 REPEAT
240 V%=BGET#X%
250 ignore%=FNignore(V%)
260 UNTIL ignore%=0
270 :
280 IF V%=4 THEN vdu4%=TRUE
290 IF V%=5 THEN vdu4%=FALSE
300 IF V%=8 THEN PROCtextmove(-1,0)
310 IF V%=9 THEN PROCtextmove(1,0)
320 IF V%=10 THEN PROCtextmove(0,-1)
330 IF V%=11 THEN PROCtextmove(0,1)
340 IF V%=12 THEN PROCoutput("stroke s
howpage")
350 IF V%=16 OR V%=24 THEN PROCgrw(V%)
360 IF V%=18 THEN PROCgcol(BGET#X%,BGE
T#X%)
370 IF V%=22 THEN PROCmode(BGET#X%)
380 IF V%=25 THEN PROCplot(BGET#X%)
390 IF V%=29 THEN PROCoutput(FNgetw+"
"+FNgetw+" translate")
400 IF V%>31 AND V%<>127 THEN PROCshow
(CHR$(V%))
410 IF V%=127 THEN PROCtextmove(-1,0):
PROCshow(CHR$32):PROCtextmove(-1,0)
420 UNTIL EOF#X%
430 CLOSE #X%
440 PROCoutput("stroke showpage")
450 IF op% THEN CLOSE #op%
460 END
470 :
480 DEFPROCtextmove(x%,y%)
490 LOCAL cx,cy
500 cx=txtsize*x%:cy=txtsize*y%
510 PROCoutput(STR$cx+" "+STR$cy+" rmo
veto")
520 ENDPROC
530 :
540 DEFPROCshow(text$)
550 IF vdu4% THEN ENDPROC
560 PROCoutput("("+text$+") show")
570 ENDPROC
580 :
590 DEFPROCgcol(type%,colour%)
600 LOCAL gray
610 IF type% THEN ENDPROC
620 colour%=colour% MOD (maxc%+1)
630 gray=1-(colour%/maxc%)
640 PROCoutput(st$)
650 PROCrem("COLOUR "+STR$colour%+" OF
"+STR$maxc%)
660 PROCoutput(STR$gray+" setgray")
670 ENDPROC
680 :
690 DEFPROCmode(mode%)
700 PROCrem("MODE "+STR$mode%+" VARIAB
LES SET UP")
710 IF mode%=0 THEN maxc%=1
720 IF mode%=1 THEN maxc%=3
730 IF mode%=2 THEN maxc%=7
740 IF mode%=4 THEN maxc%=1
750 IF mode%=5 THEN maxc%=3
760 ENDPROC
770 :
780 DEFPROCgrw(op%)
790 LOCAL left$,bottom$,right$,top$
800 IF op%=24 GOTO 830
810 PROCoutput("gsave 1 setgray fill g
restore")
820 ENDPROC
830 left$=FNgetw:bottom$=FNgetw
840 right$=FNgetw:top$=FNgetw
850 PROCrem("GRAPHICS WINDOW "+left$+"
,"+bottom$+","+right$+","+top$)
860 PROCoutput(left$ +" "+bottom$+" mo
veto")
870 PROCoutput(left$ +" "+top$+" linet
o")
880 PROCoutput(right$+" "+top$+" linet
o")
890 PROCoutput(right$+" "+bottom$+" li
neto")
900 PROCoutput("closepath gsave clip g
restore")
910 ENDPROC
920 :
930 DEFPROCplot(n%): REM Plot code
940 x2%=x1%:y2%=y1% : REM older g.p.
950 x1%=x%:y1%=y%   : REM old g.p.
960 x$=FNgetw:x%=VAL x$
970 y$=FNgetw:y%=VAL y$
980 PROCrem("PLOT "+STR$n%+","+x$+","+
y$)
990 rel%=n% AND 4
1000 IF rel% THEN r$=" " ELSE r$=" r"
1010 xyr$=x$+" "+y$+r$
1020 n%=n% OR 4
1030 IF n%=4 OR n%=68 THEN PROCoutput(x
yr$+"moveto")
```

Continued ▶

◀ In the Post. Listing 1 continued

```
 1040 IF n%=5 THEN PROCoutput(xyr$+"line
to"+st$)
 1050 IF n%=69 THEN PROCoutput(xyr$+"mov
eto"):PROCoutput(xyr$+"lineto"+st$)
 1060 IF n%=85 THEN PROCtriangle
 1070 IF n%=101 THEN PROCrectangle
 1080 IF n%=133 OR n%=141 THEN PROCfill
 1090 IF n%=149 OR n%=157 THEN PROCcircl
e(n%=157)
 1100 ENDPROC
 1110 :
 1120 DEFPROCtriangle
 1130 PROCoutput(xyr$+"moveto")
 1140 PROCoutput(STR$x2%+" "+STR$y2%+" l
ineto")
 1150 PROCoutput(STR$x1%+" "+STR$y1%+" l
ineto")
 1160 PROCoutput("closepath fill")
 1170 ENDPROC
 1180 :
 1190 DEFPROCrectangle
 1200 rx%=x%-x1%:ry%=y%-y1%
 1210 PROCoutput(STR$rx%+" 0 rlineto")
 1220 PROCoutput("0 "+STR$ry%+" rlineto"
)
 1230 PROCoutput(STR$-rx%+" 0 rlineto")
 1240 PROCoutput("closepath fill")
 1250 ENDPROC
 1260 :
 1270 DEFPROCfill
 1280 PROCoutput(xyr$+" moveto")
 1290 PROCoutput("fill")
 1300 ENDPROC
 1310 :
 1320 DEFPROCcircle(fill%)
 1330 rx%=x%-x1%:ry%=y%-y1%
 1340 radius%=SQR(rx%*rx% + ry%*ry%)
 1350 PROCoutput(x$+" "+STR$(y%+radius%)
+" moveto")
 1360 PROCoutput(x$+" "+y$+" "+STR$radiu
s%+" 0 360 arc")
 1370 IF fill% THEN PROCoutput("fill") E
LSE PROCoutput("closepath"+st$)
 1380 ENDPROC
 1390 :
 1400 DEF FNignore(char%)
 1410 IF char%>31 THEN = FALSE
 1420 IF char%< 4 THEN = TRUE
 1430 IF char%=6 OR char%=7 THEN =TRUE
 1440 IF char%>12 AND char%<16 THEN =TRU
E
 1450 IF char%=17 THEN PROClose(1):=TRUE
 1460 IF char%=19 THEN PROClose(5)
 1470 IF char%=23 THEN PROClose(9):=TRUE
 1480 IF char%>=19 AND char%<=21 THEN :=
TRUE
 1490 IF char%=26 OR char%=27 THEN =TRUE
 1500 IF char%=28 THEN PROClose(4):=TRUE
 1510 IF char%=30 THEN =TRUE
 1520 IF char%=31 THEN PROClose(2):=TRUE
 1530 =FALSE
 1540 :
 1550 DEFPROCoutput(a$)
 1560 LOCAL prefix%,i%
 1570 IF op% GOTO 1660
 1580 prefix% = ABS(P$="PRN")
 1590 IF a$="" GOTO 1630
 1600 FOR i%=1 TO LEN a$
 1610 VDU prefix%,ASC MID$(a$,i%,1)
 1620 NEXT
 1630 VDU prefix%,13
 1640 IF prefix% ELSE VDU 10
 1650 ENDPROC
 1660 IF a$="" GOTO 1700
 1670 FOR i%=1 TO LEN a$
 1680 BPUT #op%,ASC MID$(a$,i%,1)
 1690 NEXT
 1700 BPUT #op%,13
 1710 IF view% ELSE VDU 46
 1720 ENDPROC
 1730 :
 1740 DEFPROCinit
 1750 PROCoutput("% Postscript file for
"+V$)
 1760 PROCoutput("% Created by PostScrip
t Converter BAU Aug 89")
 1770 PROCoutput("%")
 1780 PROCoutput("/bbcscreen {40 800 tra
nslate 270 rotate")
 1790 PROCoutput(".5684 .4873 scale 2 se
tlinewidth } def")
 1800 PROCoutput("bbcscreen")
 1810 PROCoutput("/Courier findfont "+ST
R$txtsize+" scalefont setfont")
 1820 PROCoutput("% End of header")
 1830 PROCoutput("%")
 1840 ENDPROC
 1850 :
 1860 DEFPROCrem(a$)
 1870 IF P$<>"PRN" THEN PROCoutput(""):P
ROCoutput("% "+a$)
 1880 IF view% THEN PRINT a$
 1890 ENDPROC
 1900 :
 1910 DEFPROClose(n%)
 1920 LOCAL i%,dummy%
 1930 FOR i%=1 TO n%
 1940 dummy%=BGET #X%
 1950 NEXT
 1960 ENDPROC
 1970 :
 1980 DEF FNgetw
 1990 LOCAL a%
 2000 a%=(BGET#X%+BGET#X%*256)
 2010 IF a%>&7FFF THEN a%=a%-&10000
 2020 =STR$a%
```

See Arcface, page 61

Listing 1. CKMod source code

```
   10 REM >AFlist1
   20 REM CKMod Source
   30 REM by Dave Acton
   40 REM for Archimedes
 with RISC OS
   50 REM (c) Atomwide L
td. 1989
   60 :
   70 buffersize=245
   80 activeflag=245
   90 bufferpt1=246
  100 bufferpt2=247
  110 podulebase=248
  120 userbase=252
  130 irqmaskb=&28
  140 vflag=1<<28
  150 cflag=1<<29
  160 sp=13
  170 link=14
  180 pc=15
  190 DIM code% &1000
  200 FOR pass%=4 TO 6 S
TEP 2
  210 P%=0:O%=code%
  220 [OPT pass%
  230 EQUD 0
  240 EQUD initmod
  250 EQUD quitmod
  260 EQUD service
  270 EQUD title
  280 EQUD help
  290 EQUD commandtable
  300 EQUD 0
```

Continued ▶

◀ **Arcface. Listing 1 continued**

```
310 EQUD 0
320 EQUD 0
330 EQUD 0
340 :
350 .title
360 FNz("CKMod")
370 .help
380 FNz("CKMod"+CHR$(9
)+CHR$(9)+"1.00 ("+MID$(
TIME$,5,11)+")")
390 :
400 .initmod
410 STMFD (sp)!,{link}
420 MOV R0,#6
430 MOV R3,#&100
440 SWI "OS_Module"
450 STR R2,[R12]
460 MOV R0,#0
470 STRB R0,[R2,#activ
eflag]
480 LDMFD (sp)!,{pc}
490 :
500 .quitmod
510 STMFD (sp)!,{link}
520 BL conceptoff
530 MOV R0,#7
540 MOV R2,R12
550 SWI "OS_Module"
560 LDMFD (sp)!,{pc}
570 :
580 .service
590 CMP R1,#&27
600 BNE notreset
610 LDR R12,[R12]
620 STMFD (sp)!,{R0}
630 MOV R0,#0
640 STRB R0,[R12,#acti
veflag]
650 LDMFD (sp)!,{R0}
660 MOV pc,link
670 .notreset
680 CMP R1,#&45
690 BNE notprereset
700 STMFD (sp)!,{R0-R4
,link}
710 BL conceptoff
720 LDMFD (sp)!,{R0-R4
,link}
730 .notprereset
740 MOV pc,link
750 :
760 .commandtable
770 FNz("ConceptOn")
780 EQUD concepton
790 EQUD &0001FF00
800 EQUD onsyntax
810 EQUD onhelp
820 FNz("ConceptOff")
830 EQUD conceptoff
840 EQUD &0000FF00
850 EQUD offsyntax
860 EQUD offhelp
870 EQUD 0
880 :
890 .onhelp
900 EQUS "*ConceptOn <
0-3> enables the Concept
 Keyboard connected to t
he "
910 EQUS "specified po
dule socket. If no socke
t is specified, a suitab
le "
920 EQUS "APEC is soug
ht automatically."
930 EQUB 13
940 .onsyntax
950 FNz("Syntax: *Conc
eptOn [<0-3>]")
960 .offhelp
970 EQUS "*ConceptOff
disables the Concept Key
board"
980 EQUB 13
990 .offsyntax
1000 FNz("Syntax: *Conc
eptOff")
1010 :
1020 .badnum
1030 EQUD 0
1040 FNz("Bad podule nu
mber")
1050 .notfound
1060 EQUD 0
1070 FNz("Cannot find A
PEC with 6522")
1080 :
1090 .concepton
1100 STMFD (sp)!,{link}
1110 LDR R12,[R12]
1120 LDRB R3,[R12,#acti
veflag]
1130 CMP R3,#0
1140 LDMNEFD (sp)!,{pc}
\ already on
1150 MOV R2,#&33C0000
1160 .skipspace
1170 LDRB R3,[R0],#1
1180 CMP R3,#32
1190 BEQ skipspace
1200 BGT specified
1210 MOV R3,#4
1220 .search
1230 LDRB R0,[R2,#&0C]
1240 LDRB R1,[R2,#&10]
1250 ADD R0,R0,R1,ASL #
8
1260 CMP R0,#42
1270 BNE next
1280 LDRB R0,[R2,#&14]
1290 LDRB R1,[R2,#&18]
1300 ADD R0,R0,R1,ASL #
8
1310 CMP R0,#17
1320 BNE next
1330 STMFD (sp)!,{R5,R6
}
1340 ADD R1,R2,#&2000
1350 LDRB R5,[R1,#&810]
1360 STMFD (sp)!,{R0-R2
}
1370 MOV R0,#19
1380 SWI "OS_Byte"
1390 LDMFD (sp)!,{R0-R2
}
1400 LDRB R6,[R1,#&810]
1410 CMP R5,R6
1420 LDMFD (sp)!,{R5,R6
}
1430 BNE goodslot
1440 .next
1450 ADD R2,R2,#&8000
1460 SUBS R3,R3,#1
1470 BNE search
1480 .badslot
1490 ADR R0,badnum
1500 LDMFD (sp)!,{link}
1510 ORRS pc,link,#vfla
g
1520 .specified
1530 SUBS R3,R3,#ASC"0"
1540 BMI badslot
1550 CMP R3,#3
1560 BGT badslot
1570 ADD R2,R2,R3,ASL #
14
1580 .goodslot
1590 STR R2,[R12,#podul
ebase]
1600 ADD R2,R2,#&2000
1610 STR R2,[R12,#userb
ase]
1620 MOV R0,#0
1630 STRB R0,[R12,#buff
erpt1]
1640 STRB R0,[R12,#buff
erpt2]
1650 MOV R0,#13
1660 ADR R1,handler
1670 MOV R2,R12
1680 LDR R3,[R12,#podul
ebase]
1690 MOV R4,#1
1700 SWI "OS_ClaimDevic
eVector"
1710 MOV R0,#4
1720 ADR R1,newreadc
1730 MOV R2,R12
1740 SWI "OS_Claim"
1750 LDR R0,[R12,#userb
ase]
1760 MOV R1,#&6F
1770 STRB R1,[R0,#&838]
1780 MOV R1,#&90
1790 STRB R1,[R0,#&838]
1800 MOV R1,#128
1810 STRB R1,[R0]
1820 MOV R2,#&3200000
1830 LDRB R1,[R2,#irqma
skb]
1840 ORR R1,R1,#32
1850 STRB R1,[R2,#irqma
skb]
1860 MOV R0,#1
1870 STRB R0,[R12,#acti
veflag]
1880 LDMFD (sp)!,{pc}
1890 :
1900 .handler
1910 LDR R0,[R12,#userb
ase]
1920 LDRB R0,[R0,#&800]
1930 LDRB R1,[R12,#buff
erpt1]
1940 LDRB R2,[R12,#buff
erpt2]
1950 ADD R1,R1,#1
1960 CMP R1,#buffersize
1970 MOVEQ R1,#0
1980 CMP R1,R2
1990 BEQ bufferfull
2000 LDRB R1,[R12,#buff
erpt1]
2010 STRB R0,[R12,R1]
2020 ADD R1,R1,#1
2030 CMP R1,#buffersize
2040 MOVEQ R1,#0
2050 STRB R1,[R12,#buff
erpt1]
2060 .bufferfull
2070 LDR R0,[R12,#userb
ase]
2080 .togglepagereg
2090 MOV R1,#0
2100 STRB R1,[R0]
```

Continued▶

◀ **Arcface. Listing 1 continued**

```
 2110 MOV R1,#128
 2120 STRB R1,[R0]
 2130 MOV pc,link
 2140 :
 2150 .newreadc
 2160 STMFD (sp)!,{R1,R2
,link}
 2170 .waitforchar
 2180 LDRB R1,[R12,#buff
erpt1]
 2190 LDRB R2,[R12,#buff
erpt2]
 2200 CMP R1,R2
 2210 BNE gotone
 2220 SWI "OS_ReadEscape
State"
 2230 BCC waitforchar
 2240 LDMFD (sp)!,{R1,R2
,link}
 2250 LDMFD (sp)!,{link}
 2260 MOV R0,#27
 2270 ORRS pc,link,#cfla
g
 2280 .gotone
 2290 LDRB R0,[R12,R2]
 2300 ADD R2,R2,#1
 2310 CMP R2,#buffersize
 2320 MOVEQ R2,#0
 2330 STRB R2,[R12,#buff
erpt2]
 2340 LDMFD (sp)!,{R1,R2
,link}
 2350 LDMFD (sp)!,{link}
 2360 BICS pc,link,#cfla
g
 2370 :
 2380 .conceptoff
 2390 STMFD (sp)!,{link}
 2400 LDR R12,[R12]
 2410 LDRB R3,[R12,#acti
veflag]
 2420 CMP R3,#0
 2430 LDMEQFD (sp)!,{pc}
 2440 MOV R0,#13
 2450 ADR R1,handler
 2460 MOV R2,R12
 2470 LDR R3,[R12,#podul
ebase]
 2480 MOV R4,#1
 2490 SWI "OS_ReleaseDev
iceVector"
 2500 MOV R0,#4
 2510 ADR R1,newreadc
 2520 MOV R2,R12
 2530 SWI "OS_Release"
 2540 LDR R0,[R12,#userb
ase]
 2550 MOV R1,#&7F
 2560 STRB R1,[R0,#&838]
 2570 BL togglepagereg
 2580 LDRB R0,[R0,#&800]
 2590 MOV R0,#0
 2600 STRB R0,[R12,#acti
veflag]
 2610 LDMFD (sp)!,{pc}
 2620 ]
 2630 NEXT
 2640 SYS "OS_File",10,"
CKMod",&FFA,,code%,O%
 2650 PRINT"Module saved
 as 'CKMod'"
 2660 END
 2670 :
 2680 DEF FNz(data$)
 2690 [OPT pass%
 2700 EQUS data$
 2710 EQUB 0
 2720 ALIGN
 2730 ]
 2740 =0
>
```

Listing 2. CKMod demo

```
   10 REM >AFlist2
   20 REM CKMod Test
   30 REM by Dave Acton
   40 REM for Archimedes
 with RISC OS
   50 REM (c) Atomwide L
td. 1989
   60 :
   70 MODE 12
   80 OFF
   90 ON ERROR PROCdone:
END
  100 PROCc(1,"APEC 6522
 Demonstration")
  110 PROCc(3,"Press any
 key on the Concept Keyb
oard")
  120 PROCc(5,"ESCAPE en
ds this test")
  130 *RMLoad CKMod
  140 *ConceptON
  150 FOR i%=0 TO 127
  160 PROCshow(i%,1)
  170 NEXT
  180 last=0
  190 REPEAT
  200 key=GET AND 127
  210 PROCshow(last,1)
  220 PROCshow(key,3)
  230 last=key
  240 UNTIL FALSE
  250 :
  260 DEF PROCdone
  270 *ConceptOFF
  280 COLOUR 7
  290 IF ERR=17 THEN
  300 PROCc(30,"Demonstr
ation complete")
  310 ELSE
  320 PROCc(30,REPORT$+"
 at line "+STR$(ERL))
  330 ENDIF
  340 ENDPROC
  350 :
  360 DEF PROCc(y%,t$)
  370 PRINTTAB(40-LEN(t$
)/2,y%)t$
  380 ENDPROC
  390 :
  400 DEF PROCshow(n%,c%
)
  410 COLOUR c%
  420 PRINTTAB(8+4*(n% M
OD 16),12+2*(n% DIV 16))
;n%
  430 ENDPROC
```

See Back to the Wall

Listing 1. BBC wallpaper

```
   10 REM RelWall
   20 REM by C Attenboro
ugh
   30 REM (c) BAU Septem
ber 1989
   40 REM for B/B+/M/C
   50 :
   60 IF PAGE>&E00 GOTO
2360
   70 MODE 1
   80 HIMEM=&2580
   90 DIM palette%(5)
  100 col1%=1:col2%=16:c
ol3%=17
  110 palette%(0)=col1%+
256*col2%+65536*col3%
  120 palette%(1)=col3%+
256*col1%+65536*col2%
  130 palette%(2)=col2%+
256*col3%+65536*col1%
  140 palette%(3)=col1%+
256*col3%+65536*col2%
  150 palette%(4)=col2%+
256*col1%+65536*col3%
  160 palette%(5)=col3%+
256*col2%+65536*col1%
  170 ox=0:oy=0:os=0
  180 PROCassy
  190 CLS
  200 CALL calcstart
  210 VDU 28,32,31,39,0
  220 REPEAT
  230 CLS
  240 PROCinput
  250
  260 FOR J%=0 TO 5
  270 ?palette=0
  280 palette!1=palette%
(J%)
  290 CALL calcpal
  300 PRINTTAB(1,12);"Pa
lette"
  310 PRINTTAB(1,14);J%+
1;" of 6"
  320 PRINTTAB(1,16);"Hi
t a"'"  key"
  330 CALL startscreen
  340 IF GET
  350 NEXT
  360 UNTIL 0
  370 END
  380
  390 DEF PROCinput
  400 VDU 23,1,1;0;0;0;
```

Continued ▶

YELLOW PAGES

GRAPHICS

◀ **Back to the Wall. Listing 1 continued**

```
410 PRINT "X<";ox;">",
420 INPUT X
430 IF X=0 X=ox
440 PRINT
450 PRINT "Y<";oy;">",
460 INPUT Y
470 IF Y=0 Y=oy
480 PRINT
490 PRINT "S<";os;">",
500 INPUT S
510 IF S=0 S=os
520 PRINT
530 ox=X:oy=Y:os=S
540 s=S/256
550 VDU 23,1,0;0;0;0;
560 PROCenter(Y*Y,squarestore)
570 fi=(s*s+2*Y*s)
580 PROCenter(ABS(fi),fistore)
590 IF fi<0 CALL chsgn
600 delta=2*s*s
610 PROCenter(delta,deltastore)
620 !vistore=0
630 CALL calcsquares
640 CALL tyx
650 PROCenter(X*X,squarestore)
660 fi=(s*s+2*X*s)
670 PROCenter(ABS(fi),fistore)
680 IF fi<0 CALL chsgn
690 !vistore=0
700 CALL calcsquares
710 ENDPROC
720
730 DEF PROCenter(number,store)
740 !store=0
750 Z%=INT(number)
760 frac=64*(number-Z%)
770 F%=INT(frac)
780 !store=65536*(frac-F%)
790 store?2=F%
800 store?2=store?2 OR 64*(Z% MOD 4)
810 store?3=(Z% DIV 4) MOD 256
820 ENDPROC
830
840 DEF PROCassy
850 code%=&2E00
860 xlo=&2D00:ylo=&2C00
870 xhi=&2B00:yhi=&2A00
880 roslo=&2900:roshi=&2800
890 colour=&2700:palette=&2600
900 squarestore=&25F0:fistore=&25E0
910 vistore=&25D0:deltastore=&25C0
920 screenbyte=&7D:palstore=&7E
930 mask=&7B:masked=&7C
940 shift=&79:shiftcount=&7A
950 startlo=&77:starthi=&78
960 yl=&75:yh=&76
970 modstore=&73:xstore=&74
980 row=&72
990 scrlo=&70:scrhi=&71
1000 FOR pass%=0 TO 2 STEP 2
1010 P%=code%
1020 [
1030 OPT pass%
1040 .calcpal
1050 LDA #0:STA modstore
1060 .nextmodstore
1070 LDA #0:STA shift:STA screenbyte
1080 .nextshift
1090 LDA shift:STA shiftcount
1100 LDA #3:STA mask:CLC
1110 .nextfshift
1120 LDA shiftcount:BEQ fshiftdone
1130 ROL mask:ROL mask
1140 DEC shiftcount
1150 JMP nextfshift
1160 .fshiftdone
1170 LDA mask:AND modstore:STA masked
1180 LDA shift:STA shiftcount
1190 .nextbshift
1200 LDA shiftcount:BEQ bshiftdone
1210 ROR masked:ROR masked
1220 DEC shiftcount
1230 JMP nextbshift
1240 .bshiftdone
1250 LDX masked:LDA palette,X
1260 STA palstore
1270 LDA shift:STA shiftcount
1280 .nextpalshift
1290 LDA shiftcount:BEQ nopalshift
1300 ROL palstore
1310 DEC shiftcount
1320 JMP nextpalshift
1330 .nopalshift
1340 LDA palstore
1350 ORA screenbyte:STA screenbyte
1360 INC shift:LDA shift:CMP #4:BNE nextshift
1370 LDX modstore:LDA screenbyte:STA colour,X
1380 INC modstore:BNE nextmodstore
1390 RTS
1400
1410 .calcstart
1420 LDA #0:STA startlo
1430 LDA #&30:STA starthi
1440 LDX #0
1450 .nextstart
1460 LDA startlo:STA roslo,X
1470 LDA starthi:STA roshi,X
1480 INX:TXA:AND #7:BEQ newchar
1490 CLC:LDA startlo:ADC #1:STA startlo
1500 LDA starthi:ADC #0:STA starthi
1510 JMP sumdone
1520 .newchar
1530  CLC:LDA startlo:ADC #121:STA startlo
1540  LDA starthi:ADC #2:STA starthi
1550 .sumdone
1560 CPX #0:BNE nextstart
1570 RTS
1580
1590 .startscreen
1600 LDA #0:STA row:TAY
1610 .startarow
1620 LDX row
1630 LDA ylo,X:STA yl
1640 LDA yhi,X:STA yh
1650 LDA roslo,X:STA scrlo
1660 LDA roshi,X:STA scrhi
1670 LDX #0
1680 .nextscreenbyte
1690 LDA #0:STA modstore
1700 .sumsquares
1710 ROL modstore:ROL modstore
1720 CLC:LDA xlo,X:ADC yl
1730 LDA xhi,X:ADC yh
1740 AND #&C0
1750 CLC:ROL A:ROL A:ROL A
1760 CLC:ADC modstore:STA modstore
1770 INX:TXA
1780 AND #3:BNE sumsquares
1790 STX xstore:LDX modstore:LDA colour,X
1800 STA (scrlo),Y
1810 CLC:LDA scrlo:ADC #8:STA scrlo
1820 LDA scrhi:ADC #0:STA scrhi
1830 LDX xstore:BNE nextscreenbyte
1840 INC row:BNE startarow
1850 RTS
1860
1870 .calcsquares
1880 LDX #0
1890
1900 .nextsquare
1910 LDA squarestore+2:STA xhi,X
1920 LDA squarestore+1:STA xlo,X
1930
1940 CLC:PHP:LDY #0
1950 .nextfiadd
1960 PLP:LDA squarestore,Y:ADC fistore,Y:STA squarestore,Y:PHP
1970 INY:CPY #4:BNE nextfiadd:PLP
1980
1990 CLC:PHP:LDY #0
```

Continued ▶

◀ Back to the Wall. Listing 1 continued

```
2000 .nextviadd
2010 PLP:LDA squarestore,Y:ADC vistore,Y:STA squarestore,Y:PHP
2020 INY:CPY #4:BNE nextviadd:PLP
2030
2040 CLC:PHP:LDY #0
2050 .nextdeltaadd
2060 PLP:LDA vistore,Y:ADC deltastore,Y:STAvistore,Y:PHP
2070 INY:CPY #4:BNE nextdeltaadd:PLP
2080
2090 INX:BNE nextsquare
2100 RTS
2110
2120 .tyx
2130 LDX #0:LDY #&FF
2140 .nxttrans
2150 LDA xlo,X:STA ylo,Y
2160 LDA xhi,X:STA yhi,Y
2170 DEY:INX:BNE nxttrans
2180 RTS
2190
2200 .chsgn
2210 LDX#0
2220 .nxsgn
2230 LDA fistore,X:EOR #&FF:STA fistore,X
2240 INX:CPX#4:BNE nxsgn
2250 CLC:LDA fistore:ADC #1:STA fistore
2260 LDX #1
2270 .nxtfiadd
2280 LDA fistore,X:ADC #0:STA fistore,X
2290 INX:CPX #4:BNE nxtfiadd
2300 RTS
2310 .end
2320 ]
2330 NEXT
2340 ENDPROC
2350
2360 *TAPE
2370 *KEY 0 FOR A%=0 TO TOP-PAGE STEP 4:A%!&E00=A%!PAGE:NEXT|MPAGE=&E00|M OLD|MRUN|M
2380 *FX 138,0,128
```

See Splash Out, page 71

Listing 1. BBC hodgepodge

```
10 REM Hodgepodge Machine
20 REM For BBC B/Master
30 REM (c) Keith Edkins 1989
40 REM for B/B+/M/C
50 :
60 MODE 7:PRINT''
70 ON ERROR GOTO 610
80 n%=15:g%=7
90 DIM Q1% 0,A% 160,B% 160,C% 160,t1% 80,t2% 80
100 DIM M% 15
110 FOR I%=0 TO 15
120 M%?I%=(I%AND1)+2*(I%AND2)+4*(I%AND4)+8*(I%AND8)
130 NEXT I%
140 INPUT "1 - Random (soup)"'"2 - Random (points)"'"3 - reload from disk"'"4 - Quit"''"=> "Z$
150 IF Z$="4":END
160 IF Z$="3":CLS:*CAT
170 IF Z$="3":INPUT "Member to load",M$:ELSE INPUT "Value of n (1-15)",n%
180 IF n%>15:PRINT "Only 15 levels allowed":VDU 7:GOTO 170
190 IF n%=1:g%=1:ELSE IF Z$<>"3":PRINT "Value of g (1-";n%;")";:INPUT;g%
200 IF g%>n%:VDU 7:GOTO 190
210 IF Z$<>"3":REPEAT:INPUT "Number of neighbours (4 or 8)",N%:UNTIL N%=4 OR N%=8:!&2FFC=(N%=4)
220 IF Z$="2":INPUT "Number of points",p%
230 MODE 2:HIMEM=&2FF0:!&2FF0=n%:!&2FF4=g%:!&2FF8=0
240 VDU 23,1,0;0;0;0;:COLOUR 3
250 RESTORE
260 FOR I%=1 TO n%-1:READ J%:VDU 19,I%,J%;0;:NEXT
270 ?Q1%=0:A%?160=0:B%?160=0:C%?160=0
280 IF Z$="3":GOTO 360
290 IF Z$="2":GOTO 340
300 IF n%>1:FOR I%=&3000 TO &7FFE STEP 2
310 ?I%=M%?(RND(n%))+2*M%?(RND(n%)):I%?1=?I%
320 NEXT:GOTO 380
330 FOR I%=&3000 TO &7FFC STEP 4:!I%=RND AND &03030303:NEXT:GOTO 380
340 FOR I%=1 TO p%:GCOL 0,RND(n%)-(n%=1):PLOT 69,RND(1280),RND(1024)AND &3F8:PLOT 1,0,4:NEXT
350 GOTO 380
360 OSCLI("LOAD "+M$+" 2FF0")
370 n%=!&2FF0:g%=!&2FF4
380 PROCasm:VDU 19,n%,1;0;
390 REPEAT
400 V%=0:FOR I%=0 TO 156 STEP 4:C%!I%=0:NEXT
410 !&70=A%-1:!&72=B%-1:!&74=C%-1:!&76=V%-16
420 :
430 CALLscrgen
440 :
450 !&2FF8=!&2FF8+1:g$=STR$(!&2FF8)
460 FOR I%=0 TO 4*LEN(g$)-1
470 t1%!(4*I%)=!(&7B00+8*I%):t2%!(4*I%)=!(&7B04+8*I%)
480 NEXT
490 PRINT TAB(0,30);g$
500 T%=TIME:REPEAT UNTIL TIME>T%+100
510 FOR I%=0 TO 4*LEN(g$)-1
520 !(&7B00+8*I%)=t1%!(4*I%):!(&7B04+8*I%)=t2%!(4*I%)
530 NEXT
540 UNTIL INKEY(0)<>-1
550 *SAVE HODGEPO 2FF0 8000
560 MODE 7:*CAT
570 PRINT''"To change name of saved position":INPUT "Type the new name:"Z$
580 IF Z$<>"":OSCLI("REN. HODGEPO "+Z$)
590 RUN
600 :
610 MODE 7:IF ERR=17:RUN
620 REPORT:PRINT " at line ";ERL
630 END
640 :
650 DATA 4,2,5,6,3,7,4,2,5,6,3,7,4,2,1
660 :
670 DEF PROCasm
680 oswrch=&FFEE:osword=&FFF1
690 DIM gap% 570
700 FOR opt%=0 TO 2 STEP 2:P%=gap%
710 [OPT opt%
720 .div
730 CPX #8:BEQ div8:CPX #4:BEQ div4:CPX #2:BEQ div2:CPX #1:BEQ div1
```

Continued ▶

◀ **Splash Out. Listing 1 continued**

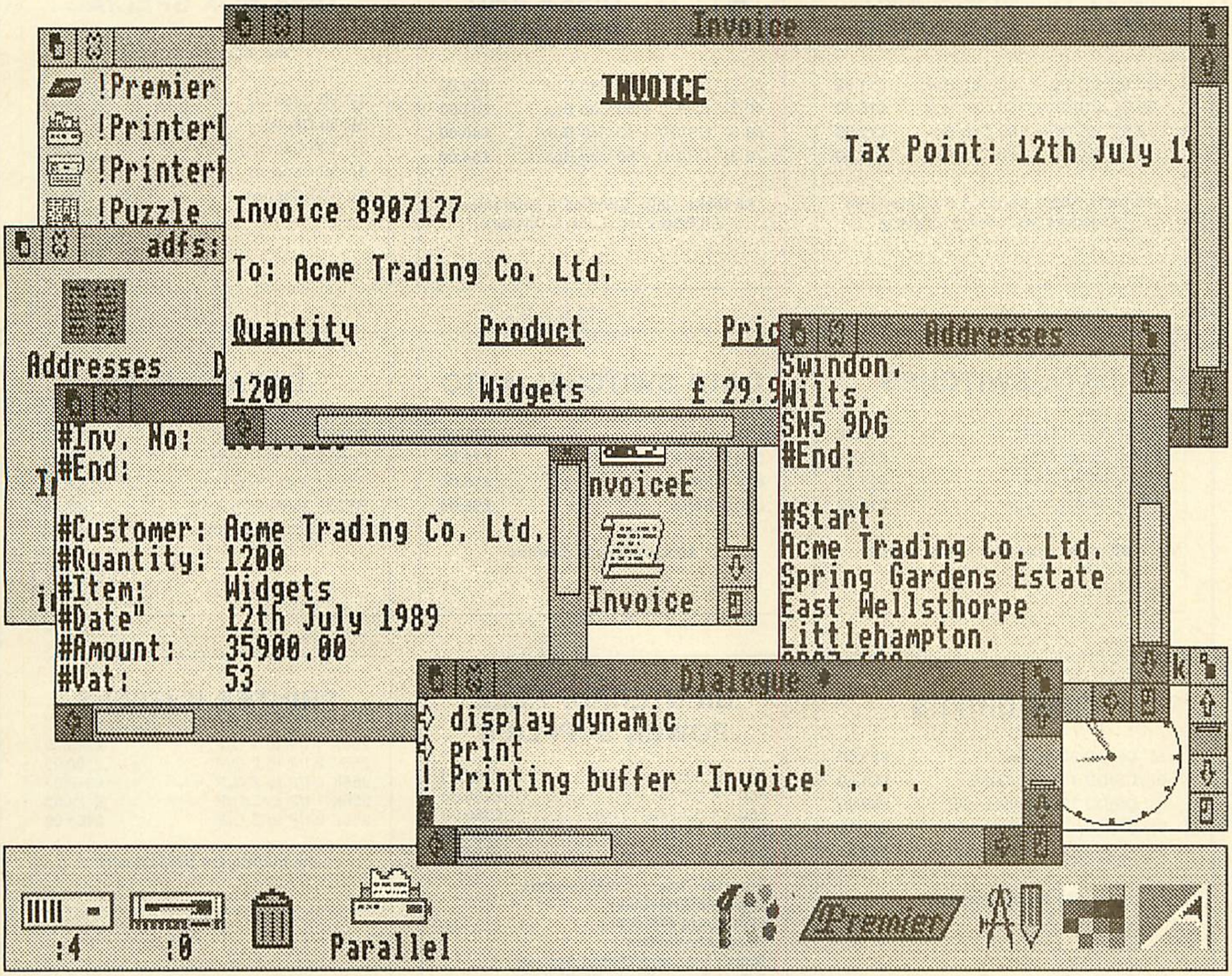
```
 740 STX &8F:LDY #0:STY &8E:CMP &8F:BCC
divex
 750 .divl1
 760 INY:ASL &8F:BCS divl1x:CMP &8F:BCS
divl1
 770 .divl1x
 780 ROR &8F
 790 .divlp
 800 ASL &8E:CMP &8F:BCC divno:INC &8E:
SBC &8F
 810 .divno
 820 LSR &8F:DEY:BNE divlp
 830 .divex
 840 LDA &8E:RTS
 850 .div8
 860 LSR A
 870 .div4
 880 LSR A
 890 .div2
 900 LSR A
 910 .div1
 920 RTS
 930 :
 940 .scrgen
 950 PHA:TYA:PHA:TXA:PHA
 960 .lingen
 970 LDX &70:LDA &72:STA &70:LDA &74:ST
A &72:STX &74
 980 LDX &71:LDA &73:STA &71:LDA &75:ST
A &73:STX &75
 990 LDA #0:STA &78
 1000 LDA &76:CLC:ADC #16:STA &76:BCC P%
+4:INC &77:JSR convh:INC &78
 1010 .rdpt
 1020 LDY #0:STY &7C:STY &7F:LDA &77:CMP
#4:BEQ rdp2
 1030 LDA (&7D),Y:ASL A:ROL &7C:ASL A:RO
L &7F
 1040 ASL A:ROL &7C:ASL A:ROL &7F
 1050 ASL A:ROL &7C:ASL A:ROL &7F
 1060 ASL A:ROL &7C:ASL A:ROL &7F
 1070 .rdp2
 1080 LDY &78:LDA &7C:STA (&74),Y:INY:LD
A &7F:STA (&74),Y:INY:STY &78
 1090 LDA &7D:CLC:ADC #8:STA &7D:BCC P%+
4:INC &7E
 1100 LDA &78:CMP #161:BNE rdpt
 1110 LDA &76:SEC:SBC #8:STA &76:LDA &77
:SBC #0:STA &77
 1120 BPL P%+5:JMP lingen
 1130 :
 1140 LDA #0:STA &78:JSR convh
 1150 .chlp
 1160 LDY &78:INY
 1170 LDA #0:STA &79:STA &7A:STA &7B:STA
&7C
 1180 LDA (&72),Y:CMP #n%:BEQ setpt
 1190 CMP #0:JSR anal:LDA (&70),Y:JSR an
al:LDA (&74),Y:JSR anal
 1200 INY:LDA (&72),Y:JSR anal:LDA &2FFC
:BNE robak:LDA (&70),Y:JSR anal:LDA (&74
),Y:JSR anal
 1210 .robak
 1220 LDY &78:LDA (&72),Y:JSR anal:LDA &
2FFC:BNE testz:LDA (&70),Y:JSR anal:LDA
(&74),Y:JSR anal
 1230 .testz
 1240 INY:LDA (&72),Y:BEQ waszero
 1250 LDA &79:LDX &7A:JSR div
 1260 CLC:ADC #g%:STA &7C:JMP setpt
 1270 .waszero
 1280 LDA &7B:LDX #3:JSR div:STA &7C
 1290 LDA &7A:LSR A:CLC:ADC &7C:STA &7C
 1300 .setpt
 1310 LDA &7C:CMP #n%:BCC P%+4:LDA #n%:S
TA &7C
 1320 LDA &78:AND #1:BNE putpt:LDA &7C:S
TA &7F:INC &78:JMP chlp
 1330 .putpt
 1340 LSR &7C:ROR A:LSR &7F:ROR A
 1350 LSR &7C:ROR A:LSR &7F:ROR A
 1360 LSR &7C:ROR A:LSR &7F:ROR A
 1370 LSR &7C:ROR A:LSR &7F:ROR A
 1380 LDY #0:STA (&7D),Y
 1390 DEC &7D:STA (&7D),Y:LDA &7D:CLC:AD
C #9:STA &7D:BCC P%+4:INC &7E
 1400 INC &78:LDA &78:CMP #160:BEQ P%+5:
JMP chlp
 1410 LDA &77:CMP #3:BEQ P%+5:JMP lingen
 1420 LDA &76:CMP #&F8:BEQ P%+5:JMP ling
en
 1430 PLA:TAX:PLA:TAY:PLA:RTS
 1440 :
 1450 .anal
 1460 BNE P%+3:RTS
 1470 CMP #n%:BEQ addb
 1480 INC &7A:ADC &79:STA &79:RTS
 1490 .addb
 1500 INC &7B:CLC:ADC &79:STA &79:RTS
 1510 :
 1520 .convh
 1530 LDA #&FC:SEC:SBC &76:STA &8E:LDA #
3:SBC &77:STA &8F
 1540 LDA &8E:AND #&E0:STA &8C:STA &7D
 1550 LDA &8F:AND #3:STA &8D:STA &7E
 1560 ASL &7D:ROL &7E:ASL &7D:ROL &7E
 1570 LDA &7D:CLC:ADC &8C:STA &7D:LDA &7
E:ADC &8D:STA &7E
 1580 ASL &7D:ROL &7E:ASL &7D:ROL &7E
 1590 LDA &8E:AND #28:LSR A:LSR A
 1600 ADC &7D:STA &7D
 1610 LDA &78:AND #254:STA &8C:LDA #0:ST
A &8D
 1620 ASL &8C:ROL &8D:ASL &8C:ROL &8D
 1630 LDA &7D:CLC:ADC &8C:STA &7D:LDA &7
E:ADC &8D:ADC #&30:STA &7E
 1640 RTS
 1650 :
 1660 ]
 1670 NEXT opt%
 1680 ENDPROC
```

Blunderbox

Just one blunder this time. Some people found difficulty designing pages using last month's Fax Form program. This was due to the absence of the cursor and can be solved by deleting line 70.

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THIS MONTH'S LISTINGS

September's monthly disc contains a number of BBC graphics programs. There are conversions of the popular 'Hodgepodge' and 'Wallpaper' Archimedes programs. Both these programs create Mandelbrot style patterns based on simple maths equations.

This month's cover feature, 'Earth Works', generates random mountainous landscapes by faulting and flooding an area of land. The results can be particularly effective if you use an Archimedes 256 colour mode.



If you are more interested in utilites, check out Hints and Tips. Programs are provided for converting Basic programs into Ascii text, printing function key strips, displaying double width and double height text and creating new screen modes. For the Archimedes user, Agora features a module filing system, a demonstration of the Risc OS Hourglass and a one line game to keep you amused!

To round off, the Postscript converter and music listing from Interlude are also included.

Making the earth move

GAMES DISC

Ten of the best *Acorn User* games on one 80-track double-sided 5.25-inch disc.

Whether you're into arcade or adventure type games this new disc has something for everyone. The games included are *Warlord, Wizalon, Castle of Nightmares, Run Silent, Run Deep, Polyominoes* and *Quadline*. We have also included three of the most popular one-line games from recent Abusers. Test your knowledge with *Mastermind* and start playing *Varpon* and *Lurch* to win.

Make sure you get your disc of fun and entertainment and send off for the Games disc today. At only £8.95 it will make the perfect gift.

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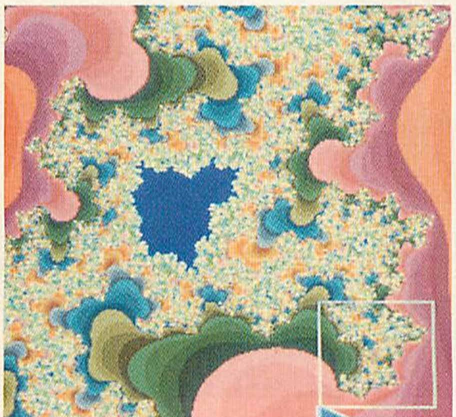


'88 COMPILATION DISC

BBC Acorn User announces the arrival of the 1988 Compilation discs:

Archimedes owners

The programs on the Archimedes version of the disc include: Arc-beeb transfer; an introduction to Arc windows; the world's fastest mandelbrots; an Arc version of the famous *Life* program; graphic special effects, In-betweening; an Arc screendump; screen compacter/decompacter; Mouse pointer editor; Arc ADFS file locator; PC and ST disc reader. Plus several of the graphics bonuses from 1988. At £8.95 this disc is a real bargain.



BBC, Master and Compact owners

Included on the 5.25in and 3.5in Master Compact version are the following programs: *Wizalon,* the bouncing wizards game; AutoROM; our *Micro Sherlock* intelligence test; Joe's introduction to spreadsheets; Bezier Curves; Microspacing and justifying for *View; Polyominoes,* and *Imagen,* the adventure creator, plus the best in graphics from 1988.

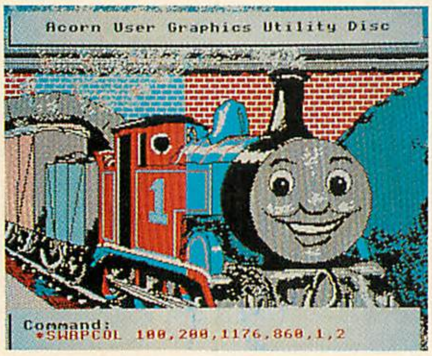
Whatever micro you have, the 1988 Compilation disc has something for everyone. The discs are keenly priced at £7.95 for 5.25in and £8.95 for the 3.5in versions.

All the very best of '88 on one disc

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SOFTWARE & GRAPHICS





Great graphics utilities

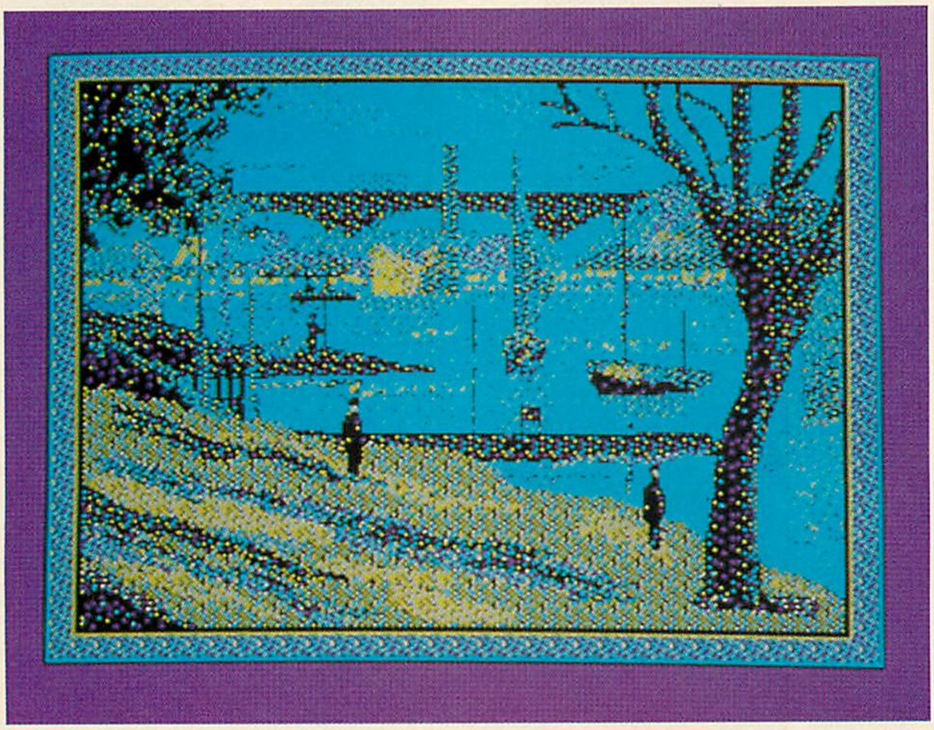
The 40-track 5.25-inch *Graphics Utilities* disc which is keenly priced at £7.95, features not only 16 stand-alone machine code utilities, an advanced teletext editor and several useful Basic procedures, it also has an easy-to-adapt disc header and index.

Included are: *Rotate, rotates area through 180 degrees; *SwapCol, swaps two colours; *ColFill, a colour-fill routine; *SvPic, saves a compacted picture; *LdPic, reloads a compacted picture. There are also many utilities to manipulate graphics.

Sideways RAM made simple

The *Acorn User* sideways RAM disc gives you many more utilities for your sideways RAM. These include: RAMpad – your computer's answer to the pad and pen; six different on-screen fonts available in all modes; a 15k printer buffer; Screen Swap – store and recall mode 4 or 5 screens; *RomHead – standard service ROM header; *RLook – allows you to examine sideways RAM or ROM.

There are many more utilities on this 40/80-track 5.25-inch disc and it's a snip at £9.95.



Micro masterpieces on Portfolio for £9.95

Jonathan Inglis, freelance illustrator, has assembled a *Portfolio* of his best work exclusively for *BBC Acorn User.*

The disc contains screens that have been used by national and regional publications. Included are Seurat's *Bathers,* a *Time Out* cover from August 1985, and two familiar *Acorn User* covers, Willow (Nov '86) and Magician (Jan '86), as well as several pictures commissioned by *The Times.*

Three of Jonathan's favourite masterpieces are on the disc; Seurat's *Riverside,* Vermeer's *Lady at the Virginal* and a copy of a famous lithograph by Matisse. Sade fans will probably be more interested in the two stunning portraits of the singer included on the disc.

You can create your own pièce de résistance using the *Pixel Editor* and *Super Painter* programs. *Pixel Editor* allows you to draw in and alter minute detail, while *Super Painter* enables you to draw lines, texture your screen and shade by mixing the eight standard colours.

Portfolio comes in 80-track 5.25-inch format with a comprehensive instruction sheet telling you about the pictures and how the artist created them. This disc can be yours for only £9.95.

TO ORDER USE THE FORM ON PAGE 106

OFFERS

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NOW C HERE

Max Phillips sees if the BBC micro is the place for the trendiest programming language to be seen

From starting out as something of a hack, C has become about the trendiest and most important programming language there is. C skills are in great demand and the majority of off-the-shelf packages for micros like the IBM PC and Apple Macintosh are now written in C.

C is successful because it gives the programmer total control over the machine and produces programs which although not as compact or as fast as assembly language, aren't far off.

Programs in C are more than adequate in terms of performance and size but have the advantage of being much easier than machine language and faster to write, debug and subsequently improve or move to a different type of computer.

So, it's perhaps surprising that you hardly ever see C used on smaller micros. Most commercial BBC programs are written in assembly language on the grounds that it's the only way to get the features into and the performance out of the machine. The reason is that C doesn't sit comfortably on 8-bit microprocessors and the 6502 chip used in the BBC in particular.

Because C is designed to be as efficient as assembly language it is more closely linked to the design and machine code of the computer than most high level languages. A 6502 C compiler is hard put to convert your original C source program into finished machine code that is as fast or as compact as C compilers can manage for other processors, let alone comparable to a hand-written assembly language program. Even the 6502's old arch rivals, the 8080 and Z80 chips, provide a better basis for C.

A second problem is that although C compilers are themselves relatively small and simple, C needs a decent environment to work in, a linker program to join several separately compiled sections and to tack on ready-written routines.

A C system therefore usually requires a reasonable memory space, disc drives (preferably a hard disc) and operating software which makes it easy to work through the various stages of building and debugging programs.



ILLUSTRATION BY MARK MANNING

So while there are implementations that run on cassette-based micros or in tiny amounts of memory, they are usually like decaffeinated coffee – all the right outward appearances but none of the real advantages.

From that ignominious start, two excellent products, Mijas Small C and Beebug C, do a remarkably good job of putting C on the BBC micro, albeit in rather different ways.

The Beebug C compiler solves the 6502 problem by cheating. Instead of converting your C program into 'native' 6502 code, it generates a 'mythical' machine code which Beebug calls D-code. To run the D-code, a special interpreter is built into the Beebug C Roms.

So, compiled programs can normally only run on a machine with the Beebug C fitted. If you want to distribute a Beebug C program or use it on several machines, you must buy Beebug's Standalone Generator. This provides a 'run-time' version of the interpreter that you can link to your C programs so they will *RUN (the Standalone package also includes a set of maths functions).

The drawback to this approach is that interpreted D-code runs distinctly slower than native 6502 code. Standalone programs also have to carry an extra 6K of interpreter code around with them.

This isn't to say the Beebug compiler is a fake – the compiler and linker are just like normal C compilers and linkers except they produce code which is then interpreted rather than executed directly by the microprocessor.

The Mijas compiler, in contrast, grits its teeth and generates a normal 6502 assembly language program from your C source code. You then run this through Mijas' capable 6502 Relocating Assembler and Linker to produce a finished program

(Mijas includes its complete 6502 development system with the C compiler).

Mijas is very much a classic C. It uses the traditional steps of C-to-assembler-to-linker-to-final program.

A lot of work went into making the old Small C work on the Beeb. Indeed, the company should be congratulated because it also offers the C source code to the actual compiler itself.

Small C programs are a stage slower and more bulky than hand-written assembly language but not unacceptable and not nearly as slow as an interpreting system like Beebug.

So, Small C is suitable for tackling serious programming jobs. Programs are inherently standalone and can be developed for use in Ram or Rom as necessary. Sections of code which need to be faster can always be improved by incorporating bits of hand-written assembler – either into the original C program (just like BBC Basic's built-in assembler), by linking in previously assembled sections, or by tweaking the assembly language file produced by the compiler.

To make the generated code more efficient, Mijas offers an optimiser for an additional £25. This reads through the assembly program produced by the compiler and attempts, with some success, to rewrite a better version of it.

The obvious drawback to Mijas C is that it's more restricted than Beebug's, both in the language itself and, more importantly for the beginner, in the libraries of ready-to-use functions that come with it.

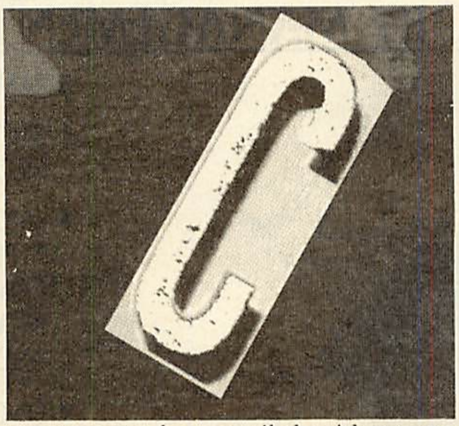
The language

C is one of the smallest and most compact computer languages and can almost be described on the back of an envelope. Like a good Spears board game, C takes hours to learn but a lifetime to master.

Much of the stuff you need to write useful programs (including being able to input data from the keyboard, display it on the screen and so on) is not part of the language but supplied in ready-written libraries of functions that you can call on in your programs.

These functions, such as PRINTF (an equivalent of other Basics' PRINT USING), MALLOC (memory allocate) and GETS (get a string from the keyboard or file) are standard and used in most C programming tutorials and listings.

Beebug C comes with a reasonable library that should allow existing C



programs to be compiled without too much bother. Mijas's standard library is more restricted – some substantial effort will be required to compile existing programs and, in some cases, to develop major new ones.

One niggle that Mijas should cure is that lack of a real MALLOC and FREE, two basic memory management functions which are just too handy to live without.

Both compilers do however come with functions that allow access to specific features of the BBC, such as OSBYTE and OSWORD calls. (Mijas curiously has added a VDU keyboard to the C language which is distinctly non-standard - Beebug does it properly with a VDU function).

In general, Beebug goes much further, providing ready access to sound, graphics and so forth whereas the Mijas user must roll his own functions from OS calls and direct memory manipulation.

It's a similar story with the language implementation itself.

Mijas is a sawn-off C. It doesn't handle floating-point calculations or structures and unions (combinations of simpler data types that can be treated as a unit) and some other more involved bits of C.

In contrast, Beebug provides a full C in terms of the accepted 'K&R' standard – the description at the back of the semi-sacred book *The C Language* by Brian Kernighan and Dennis Ritchie.

Environments

Both these compilers need a decent setup – at least one disc drive as well as Rom space (two Rom sockets for Beebug, two to four Roms or sideways Ram slots for Mijas). A degree of expertise with the BBC micro is also mandatory.

Switching between Beebug and Mijas therefore involves popping the top of the machine, moving jumpers about, rebooting and other trivia.

Beebug was kind enough to take me through this and the next hassle – its C won't work with the version of DFS built into most Masters (versions before 2.29). To use Beebug C, you either have to move it over to ADFS or UNPLUG the built-in DFS and load an undocumented Ram version of DFS (DFS2.29) hidden on the Welcome disc.

It's standard practice for C compiler manuals to assume the reader knows C and these two compilers are no different.

Even without a proper tutorial, both manuals would benefit from a clear description of the elements of the C language, how their particular compilers are used and where they differ from common practice.

Both compilers provide their own 'environment' to produce programs in – an equivalent to the basic prompt from which commands to start the compiler and so on can be given. The Beebug version is about bare minimum, offering not much more than couldn't be done from Basic with star commands. Mijas offers a general purpose 'shell' which provides something more like the command line prompt in operating systems like CP/M, MS-Dos and Unix.

Programs can be prepared with any text editor you like, provided it can produce plain Ascii files. Beebug has an EDIT command which will automatically call whatever editor you specify while Mijas has a tiny text editor built in.

Both compilers provide a way to automate the steps in compilation.

The Mijas MAKE command is followed by a filename. The computer then whips through each command necessary to build a finished program – CC to compile it, ASMB to assemble, LINK to link it and so on. MAKE works by taking a skeleton of the commands to execute from a disc file into which it substitutes <progname> (or whatever parameters you like) and creates a new file which it then EXECS to carry out the commands in turn. It is general purpose and adaptable to different tasks, not necessarily C ones.

However, it shouldn't be confused with the command of the same name on other computers. A real MAKE used a description of the relationships between the files in a project, and the time and date each was last altered, to rebuild a program with the minimum number of steps necessary, saving hours of development time. Mijas's offering is more equivalent to the batch files of other operating systems.

A real MAKE wouldn't be easy with DFS and ADFS but Mijas's version is still

much better than Beebug's equivalent. This is a utility called RUNC which takes the program name and sets the function keys to produce various commands necessary to build a finished program. It works but it can't be adapted for other tasks and doesn't let you choose what options you want in compiling and linking.

This highlights the other big hassle with the BBC as a C development system. People frequently complain that the contrary and arcane syntax of DFS and ADFS makes the BBC unnecessarily difficult to use. For example, Beebug demands the different types of file in a C program to be identified by a directory prefix such as C. or H. whereas other operating systems invariably use a separate type suffix (such as .C or .H) which has nothing to do with which directory a file is in.

However, these are minor differences that are easily learnt and overcome. The real problem is that the BBC isn't made to let programs easily be mixed and matched to work together on a particular task.

On most programs I could simply have whipped the MAKE from Mijas and used it with Beebug but MAKE is buried in the Mijas shell Rom and I've got to be 'in' the Beebug Rom to use the Beebug compiler.

Some co-operation between suppliers would help here. A blend of Mijas and Beebug's environments would be a distinct improvement.

One thing Beebug does do that Mijas doesn't is to provide command line input and output redirection.

Many C programs are designed simply to take input from a particular source, process it and output the results to a defined destination. Normally, they take stuff from the keyboard and send the results to the screen but the user can substitute a file for the input and send the results to another one.

Beebug's I/O redirection and subtle use of *EXEC means that common Unix-style utilities such as LS, SORT, WC and UNIQ can be produced for it – again a nice feature for people learning C and something missing from Mijas's shell.

The choice

It's easy to distinguish between these two products but harder to make a choice.

Beebug provides a more complete C out-of-the-box and a much faster turnaround, making it better for people learning, bringing C programs across



from other machines or typing them in from books and magazines.

It also produces working programs – they're slower than might be hoped but adequate for exploring the language and creating useful oddball utilities and personal applications.

Mijas, on the other hand, demands a lot more of the user – its restricted features and libraries mean that many C listings won't actually work without substantial effort. It does have an educational value, however. Because it is a classic development system, users can see more of how a C compiler works and what it actually does.

But Mijas's real attraction is its ability to turn out 'real' programs – good enough to sell or use everyday. Here, it acts as a quick way of writing machine code that's not quite as good as doing it by hand but is much faster, easier and more easily modified and enhanced afterwards. For the experienced C programmer tackling a BBC project, it's almost certainly the thing to use.

Most importantly, the conclusion is that both products do what they set out to do with a surprising degree of success. If you'd asked a C programmer 10 years ago if you could do a proper C on a 6502 micro, they'd probably have patted you gently on the head and gone back to their minicomputer.

Well, here's two...

Mijas C *£57.50, Optimiser £28.75 from Mijas Software, Winchester Road, Micheldever, Winchester SO21 3DG. Tel: (0962) 89352.*
Beebug C *£115, Standalone Generator £115 from Beebug, Dolphin Place, Holywell Hill, St Albans AL1 1EX. Tel: (0727) 40303.*

BENCHMARKS

	Turn around (s)	Code size (bytes)	Execution time (s)
Master 128, dual 80T disc, DFS			
BBC Basic IV	0	103	21.82
Mijas C unoptimised	130	5167	25.7
Mijas C optimised	181	6092	12.6
Beebug C 2.0 (stand alone)	65	7317	83.6
IBM PC/AT (8Mhz 80286), hard disc, PC-DOS 3.3			
Borland Turbo C 1.5	11	7858	0.6
Osborne 1 (4Mhz Z80), dual drive, CP/M 2.2			
Software Toolworks C/80	148	3640	6.1

Since benchmarks are horribly difficult things to get right, research here is limited to a simple count from 1 to 100,000 using a couple of FOR loops.

The turn around time is the time taken to re-run the program after making a change. Of course a hard disc helps out considerably but it's only your patience at stake. What really counts are the code size and execution times of the resulting programs.

Here, as might be expected, straight Mijas generates faster programs than Beebug but rather embarassingly BBC Basic outpaces the pair of them, on this simple example at least.

Basic would probably lose out if used for longer programs and falls way behind if the Mijas optimiser is used.

The optimiser, which reported 17 speed-ups and 16 space-savings on these few lines certainly seems worth having. In this case, it makes the executable file bigger because optimising drags in a few extra subroutines but this overhead is constant so on longer programs, optimising will save space as well as increase the speed. For comparison, times for an IBM PC/AT using Borland's superb Turbo C, and a creaky old Osborne 1 using an 8080 C compiler are included. The Osborne example is based on the same original Small C as Mijas.

The results, along with a quick look at the code actually generated compared to Mijas, underlines the inescapable fact that C compilers do have their work cut out on a 6502.

DETERMINED COMMS

Comms expert, Dave Janda, finds a powerful product in Termin from Cyansoft

In a market already crowded with viewdata terminal emulators, *Termin* from Cyansoft Videotex stands out. Besides being a feature-packed viewdata emulator, it also includes a scrolling Ascii terminal and a suite of menu driven utilities. Supplied on either one 80 track or two 40 track discs, it also has a comprehensive, well written user manual and three function key strips.

There is no copy protection on the discs and Cyansoft recommends a working copy is made before the package is used. This is a good idea, as the software writes to the system disc quite a lot whenever configuration files and such like are updated.

Termin will work on a BBC model B/B+ and Master 128 and can be used with one or more disc drives. An AMX (or other) mouse can be used to select menus and execute some options.

The package can also be used in conjunction with a real time clock, and a shadow Ram board which is handy for model B owners who will need one in order to use the scrolling terminal in 80 column mode.



A nice touch is the option of downloading messages with error checking

Viewdata terminal

Termin is designed to be highly automated, and the user should spend some time configuring the package for their particular needs. For viewdata use this involves entering the name, ID, password and call charge band of a particular host.

Although entry of IDs and passwords is optional, I was disappointed to find the host file is not encrypted in any way. IDs and passwords can only be sent to the host as a continuous stream with no characters such as RETURN.

This is fine for Prestel but for other systems such as the Gnome At Home where a RETURN is required prior to sending the user ID and password, the auto log-on option will not work.

Log-on options such as the ability to send ID and passwords and modem settings can be set each time a call is made or configured as default once *Termin* is loaded.

One problem is there is no facility for setting separate options for each host dialled. So, once 1200/75 baud is set it's applicable for all numbers dialled.

On-line

For this review I used *Termin* on a BBC model B together with Designer and Hi-Tec EC2400 modems. At 1200/75 baud the package operated well but at 1200/1200 and 2400/2400 baud incoming data was not reliable. The manual warns of this, but it is a fault of the package, not the BBC itself.

Termin provides all the features you would expect from a viewdata package, plus many more. Automatic message download (for use on Prestel) allows messages to be saved to disc or printed with the option of auto log-off.

There are numerous mailbox facilities within the package. A mailbox frame can be grabbed and used off-line to prepare messages that include colour codes. Messages can then be uploaded and a mailshot option automatically sends mail to several people at one go.

No error checking is employed for mailboxes that are uploaded, so the line should be clear of noise before attempting this. *Termin* is designed in particular for use on Prestel, so I am a little surprised that Dialcom's vasscom error correcting protocol is not a feature. This would have eliminated the problems of uploading/downloading data that may be corrupt.

One handy feature is the on-line clock and call costing facilities. The clock (which cannot be turned off in viewdata mode) informs you how long you've been on-line. Once the call is terminated a call log file is updated with the cost, calculated from the charge band and the time spent on-line. Utilities to view the current charges and print them out, as well as reset the quarters current total are also provided.

There are many other facilities associated with message and frame handling – text from a wordprocessor can be imported into a frame and a control code stripper converts frames into Ascii text. *Termin* also features a comprehensive viewdata editor with a pixel editor, block editing, text formatting and word wrap/justification.

Also featured is a basic scrolling dumb terminal which can be used for accessing systems such as Telecom Gold.

The Xmodem file transfer protocol is supported and a host of buffer options enable Ascii files to be sent/received with options to save data to disc or directly onto printer.

Conclusions

The pros of *Termin* far outweigh its cons and the package is good value. The user interface is excellent and this reduces the time taken to get used to the package. Cyansoft welcomes users' comments and suggestions which implies the product will only get better.

Termin; *£19.95, Cyansoft Videotex, 224a Chatham Hill, Chatham, Kent ME5 7BA.*

STUDIO MIX

Rob Miller goes for the gold of the Archimedes art packages

Atelier, Minerva's art package for the Archimedes is finally with us. I saw an early version of *Atelier* being demonstrated last year but the wait has certainly been worth it. Unlike most other art programs, *Atelier* actually begins to exploit the powerful graphics available on the Archimedes. Working in mode 15, it provides the most comprehensive list of features this side of the Quantel Paintbox. Starting *Atelier* is simple, especially for Risc OS users. Just click on the relevant icon and up pops *Atelier* on the menu bar.

If you are lucky enough to have either an expanded 400 series machine or an upgraded A3000, you will even be able to have other packages (such as *ArcPaint* or *ArcDraw*) running at the same time (you can return to the desktop at any time without losing the picture by pressing f8).

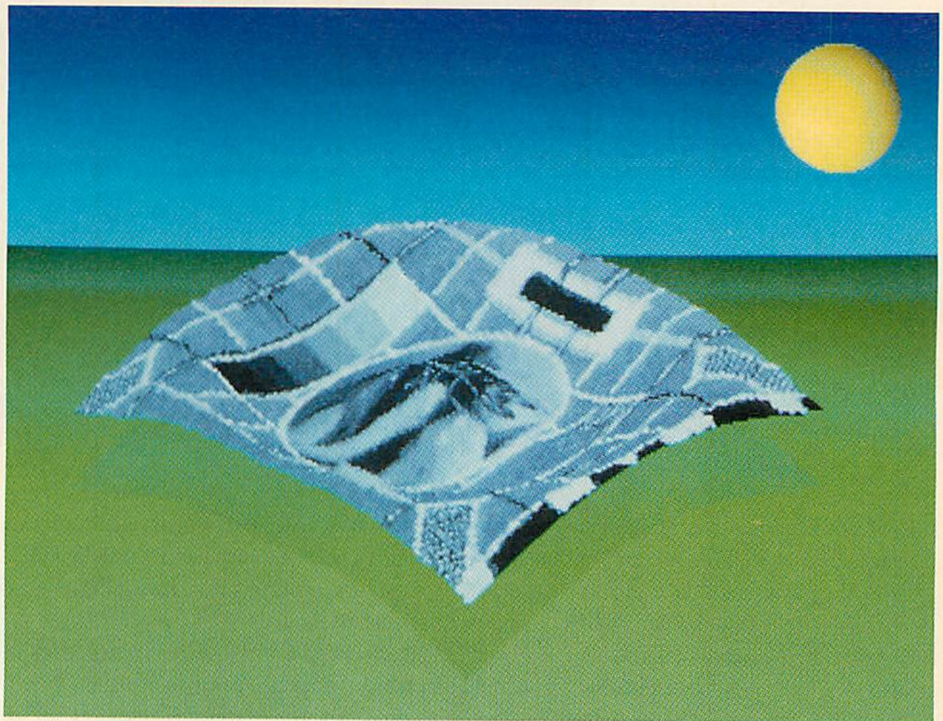
One megabyte is really the minimum memory requirement. Even on an Arc 310, memory is tight.

Clicking on the *Atelier* icon clears the screen and presents you with an introduction screen. Clicking on the middle mouse button (*Atelier* conforms to the 'Select', 'Menu' and 'Adjust' mouse standard) brings up the main menu from which all other menus are accessed.

Windows and menus are used throughout the package but the system is slightly different to other Wimp applications (such as *ArcPaint*). This is no problem in the long run although first-time users may find it a little cumbersome.

Submenus are accessed by moving off the right of the main menu, but to get back you have to click on a 'return to last menu' icon.

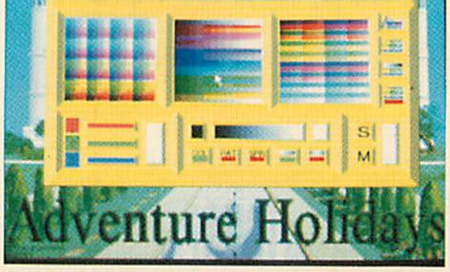
All art packages should contain basic shapes and lines with which to build up pictures. *Atelier* scores well in this area and includes a full complement, including Bezier curves. A definable grid allows shapes to be aligned easily but the real pièce-de-resistance is a cross-hair cursor that allows single pixel accuracy. The cross-hair appears on a toggleable window that also gives step by step instructions for any operations carried out in *Atelier*.



Atelier scores well with its variety of basic shapes to build with



It's a very user friendly package



Atelier has its share of extra 'goodies'

At last there is no need for constant reference to a dog-earred manual. This feature alone, makes *Atelier* the most user-friendly package I've ever used.

Once a few lines have been drawn, realistic solid objects are just a single step away. Areas of colour can be filled with virtually any shade or pattern you can imagine. Several graded fills are already defined and new fills can be constructed by just selecting the two colours you wish to fill between.

For example, if you wanted to have a sunset as a background, just select yellow and reddish-purple and *Atelier* will work out the best 'in-between' shades.

Graded fills can be made up of anything from two to 16 colours. Once defined, fills can be placed either vertically or horizontally and can be 'regular' or 'squashed' to fit in a particular shape.

Random dithering between colours in a

fill gives an extremely passable range of shades in excess of 256. It works particularly well with grey scales, even to the extent that you can hardly see the 'joins'.

Sprites can also be used as the fill 'pattern' allowing easy repetition over the screen. In addition, sprites can be used in conjunction with 'squashed' fills, acheiving all the shearing and bending features of *Art Nouveau*.

As usual, sprites can be grabbed by defining a rectangle around the desired area. There is no true sprite cut-out facility (like that in *Proartisan*) although a mask can be defined once a grab has taken place. A comprehensive sprite editor allows sprites to be enlarged, reduced and flipped.

Once defined and edited, sprites can be placed anywhere on the screen. They can even be off the left-hand side or off the bottom – at last somebody's got it right!

The memory constraints mean only a few sprites can be present at one time. I found I couldn't even grab the whole screen, on an Arc 310. Maybe a few of the less useful features in *Atelier* could have been left out to give more workspace for the user.

Like the sprite editor, the pixel editor provides a blown up view that can be scrolled. Four levels of magnification are provided from two to 16 times. A small window allows you to see the area of screen you are working on and this can be 'dragged' to allow quick movement around the screen.

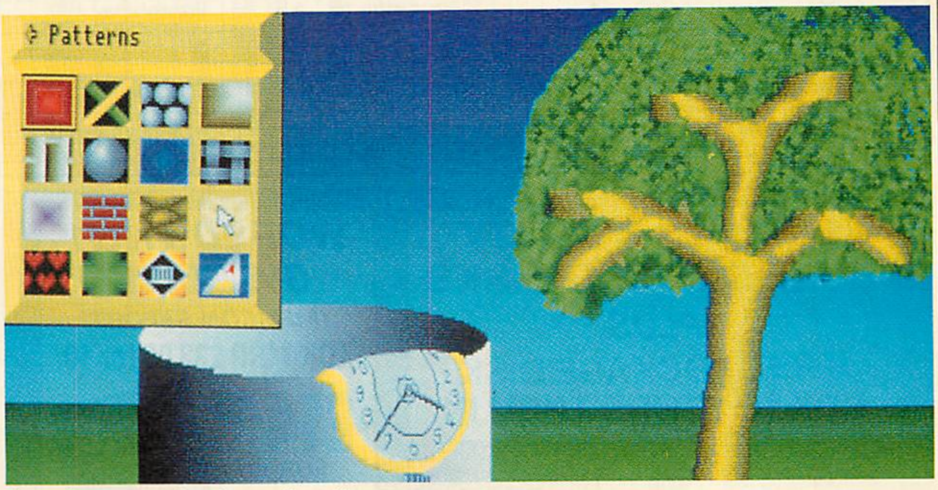
Although the pixel editor is good, it doesn't really come anywhere near to the one in *ArcPaint* (my personal favourite).

The pixel editor is only one of four 'Undos' available in *Atelier*. The usual 'full-screen' undo allows all changes made since the last time a menu was called to be removed. A 'rectangular undo' allows more selective undoing. Finally, an 'undo brush' allows 'undo' to be 'painted' wherever it is required, even down to single pixel resolution.

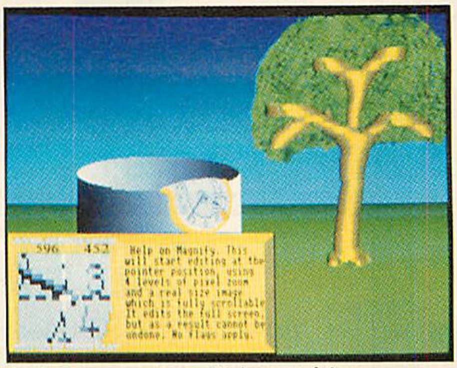
Extra, extra!

Every art program seems to have a set of 'goodies' that can be used for special effects. *Atelier* has a unique selection (not all of them that useful) which can be used to give your pictures a more professional 'feel'.

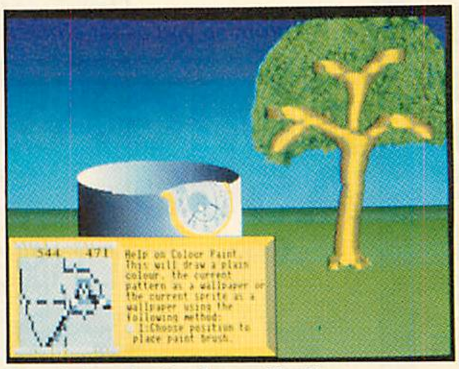
Areas of the screen and sprites can be rotated through any angle, enlarged or reduced and then plotted, all in one operation. However, this is slow (in Arc



There is a comprehensive sprite editor



A pixelator can 'chunkify' your pictures



There's four levels of magnification

terms) compared to other programs. It would have been better to have a straight rotate, with an optional scaler.

As well as stretching and twisting, an area (or sprite) can be projected onto a previously mathematically-defined surface. Areas can also be 'wrapped' around solids of rotation (such as bottles) which are also defined mathematically. A sample file of definitions is included on the *Atelier* disc.

The rest of the extras consist of a pixelator to 'chunkify' your pictures, a mode 15 to mode 13 converter and an averager to fill areas with the most common colour in that area. All these are of minor use only and could quite easily be done with a simple Basic program. I would have preferred them left out, giving more room for sprites.

Perhaps the most useful extra is an anti-alias squash – not some strange drink, but a stretchable rectangular copy that smooths over too much detail when compressing, or 'fill-in missing details' when enlarging.

Anti-aliasing or smoothing is also available on the paint menu so it can be applied to any area of the screen by brushing. Two degrees of smoothing can be applied, allowing for subtle or drastic 'smudging'.

A variety of other effects can be 'painted' using a definable brush. Intensity painting allows easy shading of areas. Colours tints can be applied to black and white digitised pictures to give them that authentic Warhol look.

Colours can also be mixed using a brush. Rather than dithering, *Atelier* actually works out the best resultant colour and uses that as the replacement. The laws of pigment are used rather than the laws of light so painting with a yellow brush over a blue background gives green.

Once your masterpiece is finished, you may want to title it in some way. Full support is given to the anti-alias font system present in the Archimedes and any of the fonts supplied on your original Welcome disc can be used.

Text can be any shape or size but is limited to the horizontal plane. The new font manager supplied with the Acorn *Desktop Publisher* should allow text to be placed at any angle.

After printing out your picture (Epson JX80, the Integrex 132 and the Laserjet standards are all supported) you should finally commit it to permanent storage, on disc.

Atelier *costs £100 from Minerva, 69 Sidwell Street, Exeter EX4 6PH. Tel: (0392) 437756.*

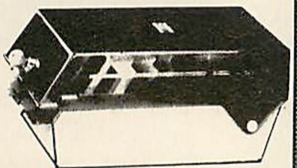
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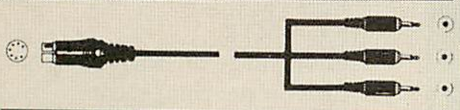


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ROCK SOLID

Richard Browning tests just how far he can go with Solidcad, the latest 3D modelling package from Silicon Vision

Solidcad is a product designed to provide a low-cost but well-featured introduction into the world of solid modelling, and this it achieves well.

On booting the program (*Solidcad* is not able to operate in the Risc OS multi-program environment), the user is presented with the standard four-windowed display – front and side elevations, plan view and 3D projection – in which to manipulate a model. The user can zoom in and out of any elevation using + and −. To zoom the 3D projection display, the SHIFT key is used as well.

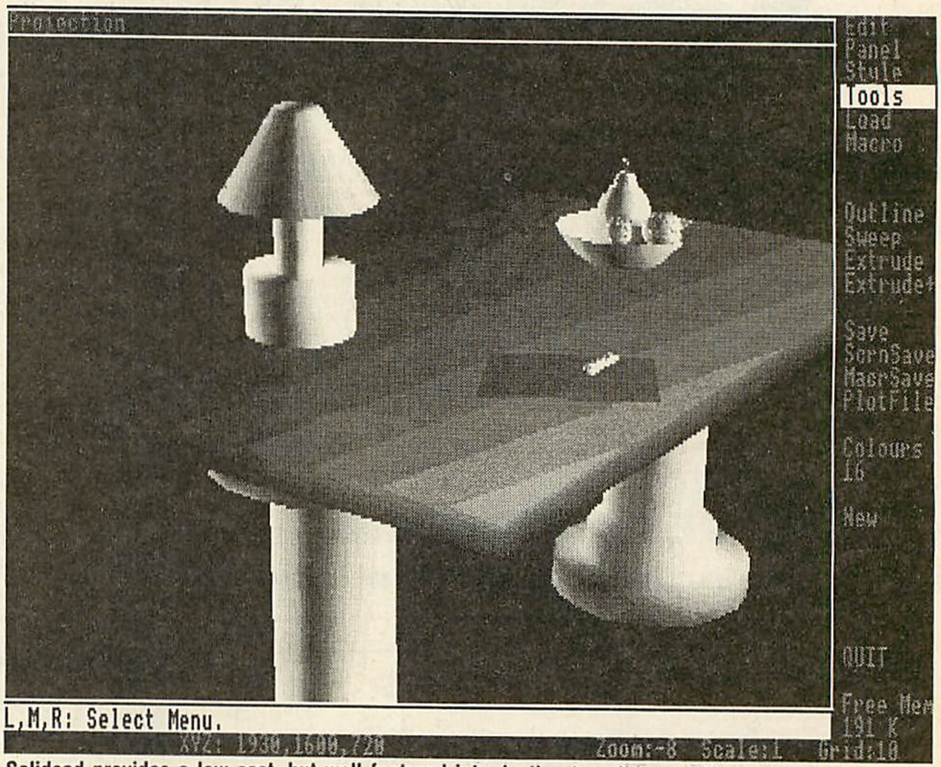
You can move the elevations around by using the arrow keys when the mouse pointer is in the window of the elevation you wish to manipulate. Again, the SHIFT key is used as well to rotate the image in the projection view. Each window can be enlarged to cover the other three, which is useful for large designs.

The program is not properly object-oriented in the way that, for example, *!Draw* in Risc OS is. However, this is not as bad as it seems because *Solidcad* provides a REGION command which allows parts of a design to be sectioned off and then moved or deleted.

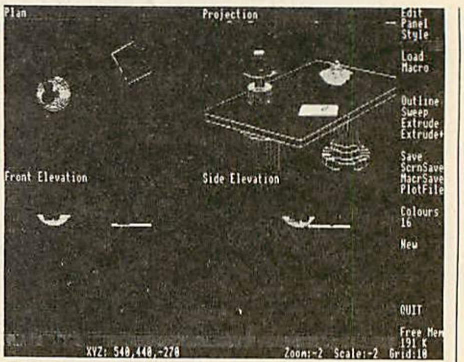
Model design

Since the mouse is a two-dimensional creature, to specify 3D points you use two different elevations to provide the required X, Y and Z components. All objects within *Solidcad* are represented by means of facets. These facets, or planes, can be defined by entering the vertices at the corners and selecting Facet from a submenu to start the process.

The order in which the vertices are specified is important. When facet is shaded in the 3D projection it must be defined to be visible from both or just one side. If the requirement is to view the facet from one side then you enter its vertices in a clockwise manner when facing the side of the facet which is to be seen. If both sides are to be seen the function DFacet is provided which means the points can be entered in either order.



Solidcad provides a low cost, but well featured introduction to solid modelling – you could do worse than invest in it



A facet can be in any of the supplied 64 colours. A complete object can be built from many facets but there are times when complex structures like tori (or toruses – doughnut shapes) need to be modelled. To make this simpler, *Solidcad* has the ability to SWEEP and EXTRUDE objects.

Sweeping and extruding

These are best explained by means of examples. Let's take the torus. A torus is a tube wrapped in a circle and a tube can be defined as just a stretched-out circle. So to create a torus in *Solidcad* you need first to define a circle. This is done using the OUTLINE command. *Solidcad* does not provide any standard shapes, so you have to generate your own. You cannot define the initial shape as anything other than an outline – which can lead to inaccurate designs if care is not taken.

Anyway, the circle is defined with OUTLINE and you can now SWEEP it around an axis which is parallel to the diameter of the circle. The offset of the sweep axis from the edge of the circle defines the radius of the torus.

SWEEP can accept two parameters which specify the angle to sweep through and the angular step used – each sweep generates a whole lotta facets which eat up a lot of memory – so it's wise to use a largish step for big objects.

Two different extrusions are possible – the ends can be left open or closed. To extrude the outline, a direction needs to be specified in which to 'pull' it. In the case of the tube, this direction will be perpendicular to the diameter of the

circle. Again, the user can specify the number of steps in which to generate the extrusion – the larger the number of steps, the greater the number of facets.

To make the circle outline more accurate when I was designing, I 'traced' over a previously-drawn circle, made by sweeping a dot around 360 degrees.

For additional positional accuracy, a grid step can be specified. In the review version the grid is not displayed in the elevations but Silicon Vision says a grid display may well be an inclusion in any future releases.

The nether regions

The REGION command is one of the more powerful features of the package. With this command, objects can be moved, deleted or changed.

When selecting REGION, a box outline appears in the elevations. This can be moved anywhere in the scene and enlarged, reduced and stretched in any direction. The box is positioned over the object on which manipulation is to take place. Whatever is in the region can now be moved. If the region is moved to touch or enter another object, the program 'dents' that object so that room is made for its intruder.

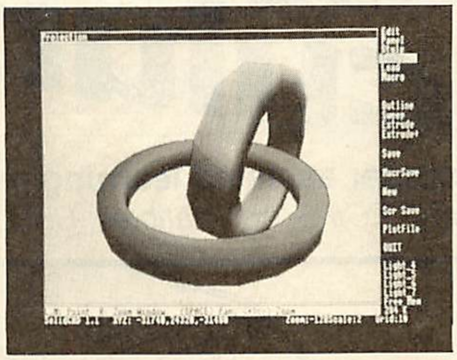
If only part of an object is regioned off then that part can also be moved while still remaining in contact with the rest of the object. So, objects can be stretched in any number of ways.

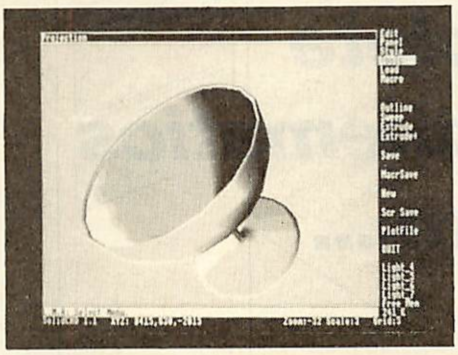
An example in the manual shows a trough made in a flat surface by moving an object into it. The regioned area can also be deleted. However, there is a bug relating to memory management when this option is used. For example, if you were to design part of an object which used 40K of memory and then deleted it using the region delete then only 20K or so would be returned for further use. Silicon Vision assures me this is being investigated.

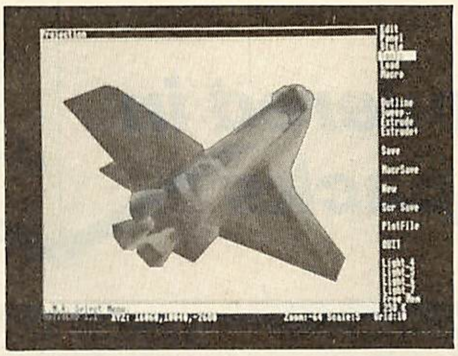
The projection display

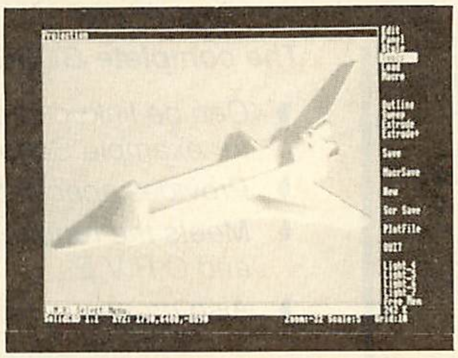
The 3D scene is shown in the projection viewport. The image can be displayed in different styles – wireframe, visible-surface outlines, filled-in facets, scanned or shaded with respect of up to eight different light sources. The user can specify the 'camera' position and the point at which the 'camera' points.

The wireframe image is just that – visible-surface outlines display the lines which are visible from the current view-









ing position (remember the way the facets must be specified in a clockwise manner, or are double-sided). Convex and concave are different ways of filling in the facets (with or without outlines) and again the manner in which the facets were first drawn becomes apparent in these options.

Scanned images always display the correct solid image but the shaded display is the most impressive. The eight different light sources can have different intensities and positions. When the SHADE option is selected, the program computes how bright each point in every facet should be. The DSHADE option doubles the number of light sources by reflecting the original sources in the x-y plane.

If the 16-colour mode 12 is used, the display is in shades of one colour only, such as red, blue or grey (user-specifiable). However, in the 256-colour mode 15, all 64 colours are displayed in (apparently) 16 shades.

Although the program can't render shadows, reflections or transparencies (a module add-on to *Solidcad* called *Solidrender* to do all these should be appearing soon) the resulting image is still most impressive and can be quite useful.

Realtime graphics

Not included in the basic package but an extra which extends it's capabilities enormously, is the Realtime Graphics Language. The RGL enables you to display and manipulate objects designed in *Solidcad* from within your own programs. As RGL is accessed via SYS, it can be used from any language.

Most of the commands available in *Solidcad* are specifiers in RGL, plus some which are used for animation such as page-toggling.

All the programmer needs to do is load the object into memory and tell the RGL module where that memory is. The object can then be displayed in any of the methods described above, rotated, transformed and so on.

Conclusion

Apart from a few minor quibbles, the program impressed me – mainly because it supplied those features found on packages whose cost is several orders of magnitude greater!

Presentation could be improved – particularly better use of the mouse and menu environment (it is certainly not a Wimp-based system). The manual is adequate although the screen dumps are not terribly clear or sharp.

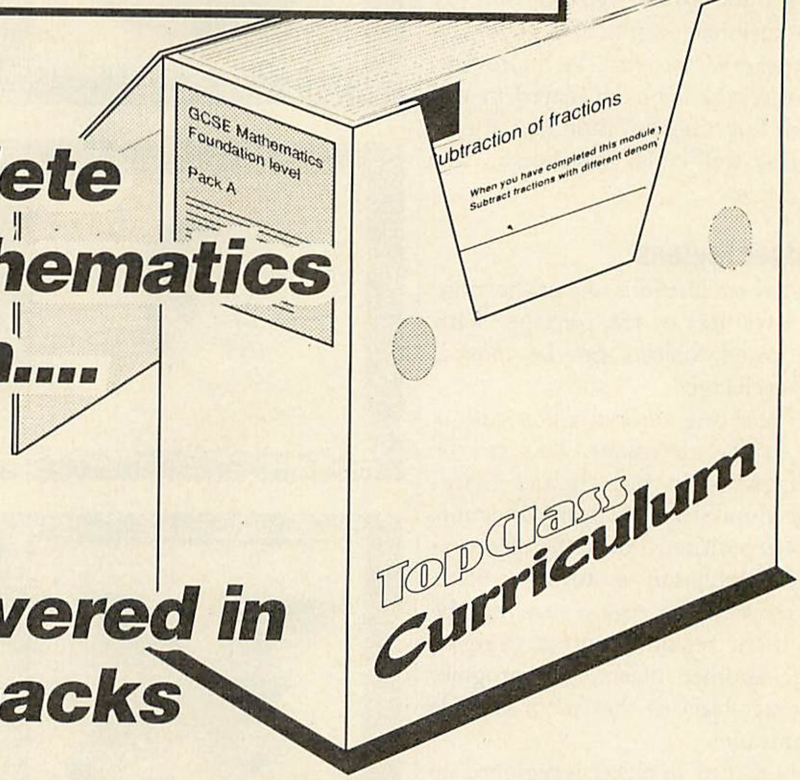
The RGL is the icing on the cake. It is now perfectly possible to write an *Elite* clone on the Archimedes using a compiled language and this most versatile module!

If you are looking for a cheap but useful solid modeller, you could do far worse than invest in *Solidcad.*

Solidad, *£89.95 for the Archimedes is published by Silicon Vision Ltd, Signal House, Lyon Road, Harrow, Middlesex HA1 2AG. Tel: 01-422 2274.*

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FLIGHTS OF FANCY

Dave Futcher takes to the air, and tests out four packages that leave him impressed

Flying in an aircraft now seems common to most of us. Although few of us do it more than three or four times a year, flying has long caught people's imagination and it still does!

Flight is a theme in the classroom across the land and when you consider the cross curricular possibilities a topic on flight offers there is no wonder why!

Unlike a number of popular classroom topics there is plenty of good educational software available to support and link into this work.

Flight

Flight is part of the *Introducing Geography* pack from BBC Soft and is a firm favourite in schools. It provides junior school children the possibility of actually taking on the role of being a long distance airline pilot.

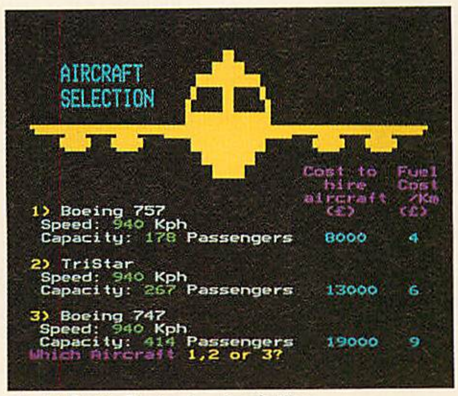
When the children come to pilot their aircraft, they find that the automatic navigation has failed so the route has to be plotted.

Four major trips are possible: London to Adelaide, London to Johannesburg, London to Los Angeles and London to Buenos Aires. Each route is divided into a number of stages, and flown one stage at a time. The flight to Adelaide, for example, is via Cyprus, Karachi, Colombo, Singapore and Darwin.

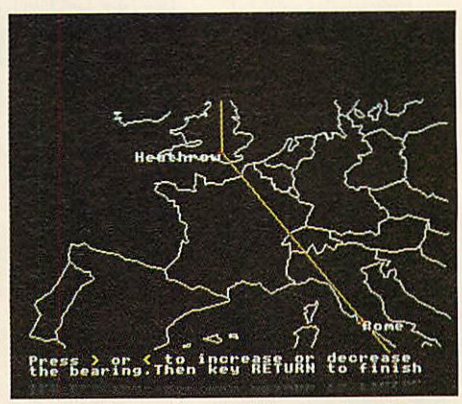
The software presets the aircraft's height and speed but it is possible to alter these to manoeuvre the plane through perilous mountain ranges and to land safely.

Various hazards are built into the program and are related to the user's pre-flight planning. If the distance of the flight has been incorrectly estimated, the fuel will run out and the plane will crash.

As well as the role playing nature of the simulation, *Flight* is an ideal program for increasing children's understanding of distance, direction, geographic features and climatic zones as well as for improving atlas work.



Flight Path: first rate simulation



Flight Path: good insight into planning flights

Flight Path

Developed by Storm Software, *Flight Path* is another package which gives children the chance to play the role of an airline captain. This simulation goes much further than *Flight*. It covers some of the implications involved in running an airline and gives a good insight into what is involved in planning a flight.

You start by planning the route. You select the departure and destination airports and even decide to make one or two stopovers on the way to fill spare seats and earn extra revenue, although this must be set against additional handling charges and fuel costs.

The children then have to choose the aircraft best suited to their needs, considering the number of passengers and range. There is the choice of three aircraft – Boeing 747, Tristar and a Boeing 757. Each flys at the same speed of 940kph but they have different seating capacities, cost different amounts to hire and the fuel consumption varies.

There are on-screen measurements to make for the flying distance and the bearings. To find the distance between airports you are given the choice between using an atlas, or using the computer's built in measuring device. This consists of an oval centred on the first airport. It is varied in size until the perimeter passes through the second airport. The distance is then indicated on the screen.

Bearings can also be calculated with the help of the computer. With one line pointing north, you turn the other line with the keys until it passes through the second airport. The bearing is calculated and appears on the screen. Of course, an atlas can be used and the computer could check the results.

The weather too, has to be carefully judged, with the possibility of course and speed direction because of wind.

After the flight details are finalised, the child using the simulation chooses a flying altitude from 4000, 6000, 8000 or 10000m. Children soon learn that the higher you fly, the less fuel you use as the air is thinner and offers less resistance.

The section dealing with wind in *Flight Path* is particularly well done. It offers a first rate demonstration of how an aircraft can be blown off course by the wind and how to correct it. The program effectively shows the wind angle and explains course corrections.

All the flight calculations are finally put to the test, when the aircraft takes off and makes the planned flight. If the calculations are correct, the aircraft will land safely at whatever airport was chosen. If not, there will be a crash landing involving costly recovery.

For each leg of the flight, a section of the map is drawn on the screen with the departure and destination airports

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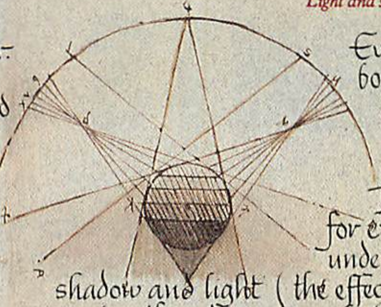
Leonardo Da Vinci, hailed as the perfect painter. Creating priceless masterpieces with oil, canvas, pen and ink that are marvelled at in galleries world wide.

Leonardo Da Vinci (1452 – 1519)



Self Portrait c.1513 drawn in Pro-Artisan c.1989

Light and shadow theory c.1492

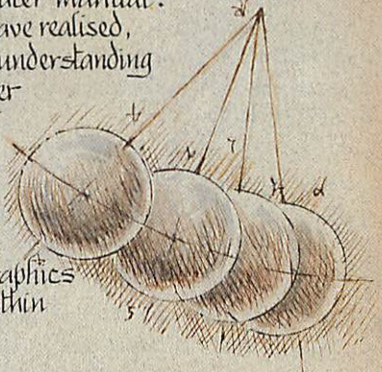


Even more mind boggling is his analysis of optical principles. Ray tracing, for example, his understanding of shadow and light (the effect of light moving three dimensional objects) reads like a computer manual.

He will not have realised, but he had all the understanding of modern computer graphics, without the technology to put it into practice — what frustration.

Today, such graphics manipulation is within everyone's grasp.

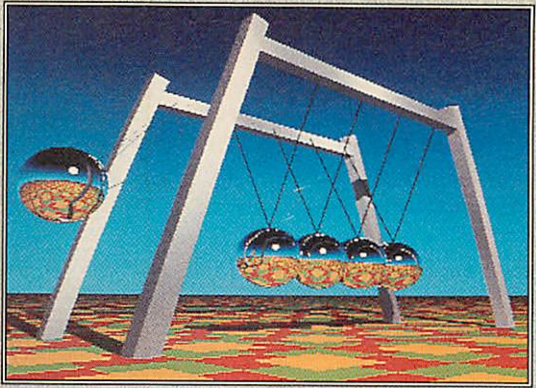
Detail of Delta Animation



What marvels then, could he have created with modern tools within his grasp?

Like Pro-Artisan from Clares. A computer graphics and image manipulation package which, combined with the Archimedes, produces breathtaking graphics. Bending, shaping, colouring and toning to your every whim.

Newton's cradle



Screen detail of Render Bender

Eye Detail



Mag × 2 in zoom mode



Mag × 4 illustrating pixelisation

A modern day paintbox.

With which (it may be fair to assume) his self portrait may have looked like the image above, and with Pro-Artisan's zoom facility, he could have created even greater detail.

Da Vinci was indeed a genius.

Ahead of his time. A latterday Einstein. Creating wild and wonderful inventions like machines that fly, elaborate ships and submarines.

With Render Bender from Clares which, using ray tracing, allows the production of 3D scenes and objects. And then allows them to be animated, every shadow and reflection is perfecly calculated, appearing as it would in real life.

A computer generated movie, inside your own machine. Even better, your own soundtrack can be added.

What's more, interaction is now possible between Pro-Artisan, Render Bender and Armadeus.

A superb package, but spare a thought for poor Leonardo, if only he had then, what we have now.

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Render Bender – £79.95 inc. vat.

marked. The display shows the aircraft take off and fly according to the values calculated and entered. If you make a perfect landing, the screen will show a balance sheet for this leg of the flight and you can proceed to the next leg. When the final destination is reached, a summary balance sheet will appear.

Flight Path is an excellent simulation. It is purposeful and using the program involves the children in making logical decisions and accurate calculations. It is a wonderful way to cover mathematical work on distance and bearings.

However, *Flight Path* is also more than this. It really is a chance to view and experience part of the world of aviation. This program certainly makes a first rate attempt to simulate a real life event.

Sky Routes

Sky Routes from Magnolia Soft is the most recent package. While *Flight* and *Flight Path* are centred around piloting passenger airliners, *Sky Routes* involves an air freight company.

The aim of the simulation is to collect and deliver cargo using the most cost effective and economic routes.

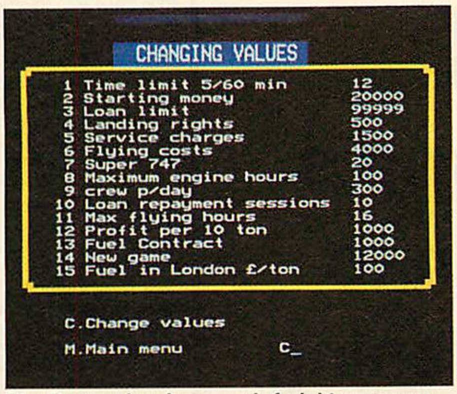
It is, however, more a flying than a business simulation. The children play the role of captain of a Boeing B747, which can take 60 tons of cargo. Helping them is a co-pilot and a flight engineer who monitor various systems such as fuel-flow, hydraulics, pneumatics and air conditioning.

The simulation starts at London Heathrow and in the initial levels, routes take in Athens, Madrid and Lagos. At the highest level, 17 destinations are available including Cairo, Tokyo and Delhi.

Once the children have decided on the name of their own freight company, the screen clears to show an outline of the 747 and a message that there is no cargo on board. After a few seconds the main working screen appears – the cockpit. Out through the cockpit you are shown a basic map of northern Europe with the UK in the centre.

No attempt has been made to use even the limited power of teletext graphics. England, Wales and Scotland are shown as a long rectangle with Ireland as a smaller rectangle alongside. Around the window are three dial type instruments which show crew hours, fuel, and the session time.

The group's first task is to load the 747 with cargo. The screen display indicates



Sky Routes: involves an air freight company

what is stored at each airport. For instance the children may be told the following:

Airports	Tons	Destination
London	50 medicine	Athens
Athens	60 medicine	London
Madrid	40 clothing	Lagos
Lagos	50 cars	London

Items of cargo can be picked up and loaded aboard the plane. Then you're off.

Flying the 747 couldn't be simpler. *Sky Routes* is certainly no flight simulator. You merely press F and then type in your destination. However, you are expected to make final checks on fuel, servicing, the crew and whether the airport is open.

At the lower levels of the simulation (there are eight) warnings are given if the pilot needs to attend to things like fuel or changing the crew. This means *Sky Routes* is ideal for use with a range of ages and levels of ability.

By the time the simulation is played at Level 5 and above it is totally different. All sorts of additions occur to the basic scenerio. Landing rights have to be acquired. Fuel can only be obtained in certain cities and it's possible for actual fuel contracts to be negotiated. Crew rest times can be taken and standby crew can be placed in certain parts of the world awaiting your arrival.

From a simple to run and understand program at Levels 1-3, *Sky Routes* can become complex, requiring much discussion and co-operation between the group using it and this is it's greatest asset.

Pathfinder

If you are looking for the ultimate in an educational flying simulation it must be *Pathfinder* from Cambridge Software House. This is a large scale simulation that can be used at home as well as in the classroom. The program has been designed to be run over an extended period as part of a project on flight.

There are three main parts to the program – Flight Planning, Begin Flying, and Debriefing. As well as a real screen by screen guide to running the software there are 12 briefing sheets. Although these are not intended to be a guide to flying they provide an excellent starting point and give all the information required for the program.

The main aim is to provide a mathematical and geographical environment in which users can involve themselves in the decision making of flying from and to any of over 300 airfields worldwide in the program's data bank.

Using the program will involve children in planning a flight, map reading, navigation and post flight debriefing, not to mention the actual flying itself.

Unlike the other packages, with *Pathfinder* you do not fly the plane. It is not intended to be a flight simulator in the traditional sense. *Pathfinder* is not like Acornsoft's *Aviator*. It does not duplicate the flying characteristics of a specific aircraft or require a pilot's understanding. But in the Begin Flying section you do take control.

Conclusion

Flight, *Flight Path*, *Sky Routes* and *Pathfinder* are all high quality software packages that will provide considerable opportunities for cross curricular work, especially in mathematics and geography classes for children of eight-14.

Any of these packages can play an integral part of a class project on flight. They all stimulate discussion and will be the basis for decision making, planning and testing of strategies, hypothesising and logical problem solving.

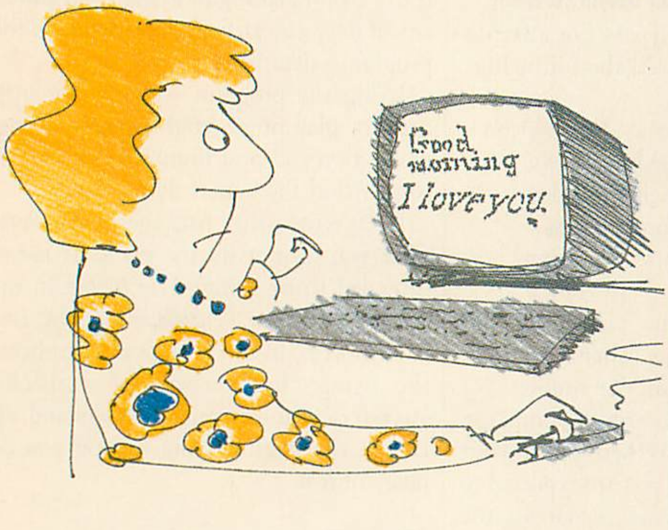
I'm sure too that many teachers will be flying *Pathfinder* at weekends on the school's Beeb!

Flight is part of the *Introducing Geography* package of four programs which costs £20 from BBC Soft, 35 Marylebone High Street, London W1M 4AA. Tel: 01-576 2548. *Flight Path* is published by Storm Software. It costs £17.65 from AVP, School Hill Centre, Chepstow, Gwent NP6 5PH. Tel: (0291) 270211. *Sky Routes* is published by Magnolia Software. It costs £21.05 from Soft Teach Educational, Stugess Farmhouse, Longbridge, Deverall, Warminster, Wilts BA12 7EA. Tel: (0985) 40329. *Pathfinder* costs £28.60 from Cambridge Software House, The Town Hall, St Ives, Huntingdon, Cambridge PE17 4AL. Tel: (0480) 66805.

OFFERS

DTP BOOK

David Hewson's Introduction to Desktop Publishing



The second book in the Gordon Fraser Desktop series is now available and is a must-for anyone interested in DTP.

Desktop publishers can save a great deal of money and time if they have the right system. Choosing this system is not easy. There is intense competition in the field of DTP, and developments are taking place at a bewildering rate. This book aims to give the buyer all the information required to make exactly the right selection. It contains clear explanations of: what desktop publishing is; the type of publications that are ideal for the process; the many uses of DTP systems; businesses to which DTP is suited; the skills required.

David Hewson is the founder and publisher of *The Wordsmith*, a bi-monthly magazine for writers and publishers using new technology.

Introduction to Desktop Publishing is available through *BBC Acorn User* for only £12.50.

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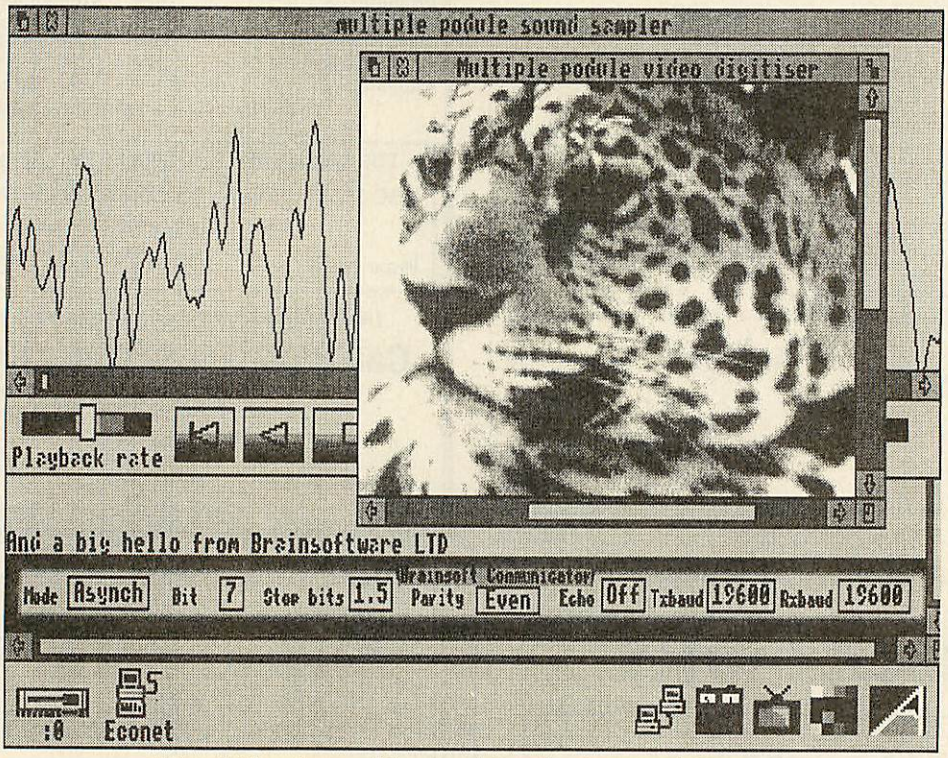
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JACK OF ALL TRADES

The I/O podule from Brainsoft is capable of many things. Rob Miller asks if it's master of any



Video digitiser is one of the most interesting features of the podule

The main problem with the Archimedes 300 series is the limited expandability. Acorn only included a backplane capable of holding two peripheral modules (podules) – half the capacity of the backplane fitted as standard in the 400 range of machines.

Fortunately a four-slot backplane for the 300 appeared on the market and this went some way to solving the expansion problem.

Now with the podule market booming it doesn't take long to fill even four slots, so where does one go from here? The answer – already adopted by Acorn with its I/O podule – is to put several podules onto one 'super podule'.

Brainsoft has done just that and the result is a densely populated but compact, single-width podule giving video digitising, sound sampling, analogue to digital conversion, serial communication and Rom Ram expansion.

Fitting is simply a case of taking the lid off your Arc, slotting the single-width podule into the backplane, screwing it in and then putting your machine back together. Owners of 300 series Archimedes will, of course, also require a backplane.

The podule offers five facilities, each of which can be accessed through varying levels of control. SWI calls are provided for machine code level programmers and use the standard syntax.

Second level star commands allow the podule's features to be used from within Basic (or other languages) programs or from the CLI (command line interface). Both first and second level commands are provided in a Rom which sits on the board itself.

As with other podule software, modules are automatically downloaded into the Archimedes on switch-on, so commands are present at all times.

The third (and top) level of control is provided with a front-end application that runs under the Risc OS desktop. This will not work with the old Arthur operating system so users who still have this would be advised to upgrade as soon as possible.

The front-end comes on a single disc along with several other utility programs. Once loaded, the front end installs itself on the Applications menu bar. Three 'sub-applications' are represented by a television (video), a tape recorder (sound) and a pair of linked computers (serial communication) respectively.

A !Readme file provides up-to-date information, the most remarkable of which is that all the software is public domain. That is, you can copy and pass on the software to other users. This may seem a bit odd when the programs are so specific but should allow people to see what they'll get before they part with their cash. Public domain software should be encouraged and I fully endorse Brainsoft's stand on this.

At the moment, the software (including the Rom) is still in a semi-development stage and can be upgraded free of charge to the full 1.2 release. The functions provided by the podule can be divided into three groups: input, output and memory specific. Out of the five functions provided on the card, input covers the video, sound, analogue and serial links. Output also covers serial, and memory refers to the Rom Ram expansion capabilities.

Video

Perhaps the most interesting features are the sound and video and it is for these that most people will buy the podule.

The video digitiser takes its input from any video source via a BNC socket. Due to the time taken to 'grab' a picture, the digitiser requires a stationary image, so a video camera or a video recorder with a good still should be used.

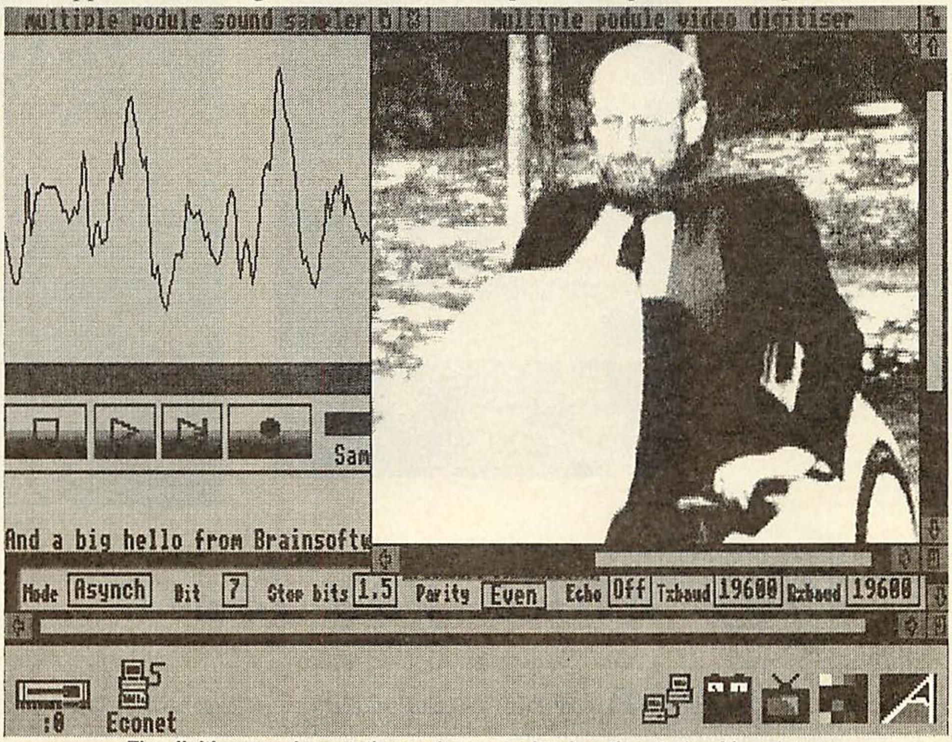
Pictures can be grabbed in either mode 12 or 15, providing 16 levels of grey (or 64 for those with monochrome monitors). I tried the output from a videodisc player

(perhaps the best still picture possible) but found the results to be a little disappointing.

First, an annoying zig-zag pattern appeared at different places on the image after successive grabs. According to Brainsoft, this is caused by Risc OS but should be cleared up in release 1.2 of the podule software.

When using 16 grey levels, pictures only appear to be digitised using about eight levels, giving the appearance of being underexposed. By changing the palette back to its default colours (similar to mode 2), it can be seen that all greys have been used. On a scale of 1 (black) to 16 (white) shade 12 is about average. Again, this is a software fault and should also be alright in release 1.2.

Finally all pictures get clipped when digitised. That is, about one-fifth of the original picture missing from the right hand side of the grabbed screen. On the plus side the digitiser makes a good 'scanner' for DTP work. Even with the extra cost of a cheap monochrome video camera (secondhand CCTV cameras are ideal), the podule is far cheaper than the specialised scanners currently available.



The digitiser needs a stationary image as it takes time to 'grab' a picture

Sound

Until recently, the only sound sampler available for the Arc was that supplied by Armadillo. The difference in price is in favour of the Brainsoft podule but how does it compare in use?

Unlike Armadillo's podule, the I/O podule comes with only bare-bones software. You can set the sampling rate, sample, set the playback rate, and then play the sound.

There is no way of editing any sampled sounds although samples can be saved to disc for later playback. The desktop front-end offers 'tape-recorder style' controls allowing sound to be recorded, played forward or backwards at either fast or normal speed.

In use, the software gets confused when you try to playback a 'blank' sound. Spurious noise played continuously and could only be stopped by pressing the RESET switch at the back of the keyboard.

Incidentally, when an error is actually trapped by the software, the I/O application shuts down and is removed from the Desktop menu bar. This happens with all the 'sub-applications'.

The quality of recorded sound is not as good as one would expect. The podule requires a specific level for input, but unfortunately, this isn't mentioned anywhere in the documentation.

Most people who want to record sound will want the clearest possible. Even with some experimentation, I was unable to obtain a clean sound free from distortion. I can't really recommend the sampler part of the podule to any serious users.

If you buy the podule for its other features, the sampler would be an extra, and in that capacity, serves well as an introduction to sound grabbing.

The podule is specified as offering stereo sampling although the necessary software for this is only present in software release 1.2.

Other applications

A four channel analogue to digital port behaves in exactly the same manner as the one in the 8-bit BBC machines. Software control is provided through the familiar ADVAL command, already present in Basic 5. Like its 8-bit counterpart the A-D converter gives a value in the range 0 to 65520 depending on the input voltage.

The converter works well under the Risc OS 65Host BBC B emulator with the original Acorn joysticks. Other peripherals designed to work with the A-D should function accordingly.

A standard RS232 interface is implemented and allows the connection of other computers to the Archimedes. Pinouts are given for linking an IBM compatible or BBC B micro. Any other micro that supports serial communication would also work. Simple terminal software is provided by the front-end. Connecting with machines that aren't catered for can be overcome by writing simple drivers using the low-level commands supplied in Rom.

Four sockets are fitted on the podule to allow extra software in Rom to be added to your Archimedes. One socket is occupied by the podule Rom leaving 384K (3 × 128K) expansion room free.

At the moment there are no Roms produced for the Archimedes, although a number of 'legal' 6502 based BBC B Roms should execute under the 6502 emulator.

Is it all worth it?

Together, the five parts of the podule represent good value for money. Although there are faults it's difficult to complain about something costing half that of a dedicated unit. Perhaps Brainsoft could put the sound and video onto a separate podule, improve the software/hardware and then charge a similar price. It would then have a product which would give other companies something to worry about.

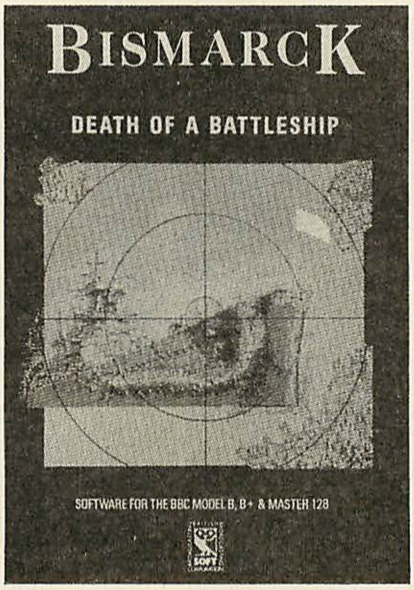
Until then, if you want to 'try out' digitising or sound sampling, go out and buy the board. To put together a similar set-up from 'separates' would cost approximately £600 – you can't really go wrong.

Multiple input/output podule £134.55 from Brainsoft, 106 Baker Street, London W1M 1DF. Tel: 01-486 0327.

OFFERS

BBC GAMES







Play while you learn

The three BBC games on offer this month are all a little bit more than games, they are great fun to play while being excellent teaching aids. So pick up one or all of these games and learn to play battleships, bridge or chess this year.

Re-enact the most memorable naval battle of the second world war with *Bismarck*, the enthralling strategy game based on the Royal Navy's frantic search for the predatory German battleship *Bismarck* in the spring of 1941. Pit your wits against the computer or take either the British or German role against the other player. You could try an exciting alternative battle plan and remake history!

Every time you play, the User Guide also gives you all the historical background to the battle. *Bismarck* is available for the BBC B, B+ and Master 128 at only £14.95.

Black Queen is an absorbing contract bridge program, a must for complete beginners or experienced players alike. In addition to features such as bidding, playing and scoring, you can construct deals from standard or 'Classic' ones in books or newspapers, and experiment with 'tailor-made' deals. *Black Queen* offers you an almost inexhaustible source of bridge enjoyment and comes on disc for the BBC B, B+ and Master 128 at £14.95.

White Knight Mk 12 is a game with the features offered by a sophisticated and powerful chess program. These include a 'thinking moves ahead' display and a facility to step forwards or backwards through 120 moves. You can also change sides with the program or try out the frantic pace of playing 'blindfold' chess! *White Knight* also features pawn promotion and elapsed time clock for white and black. The game is an advanced update of *White Knight Mk 11* and is on disc for the BBC B, B+, Master 128 and Master Compact at £14.95.

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BRANCHING OUT

Dave Lawrence checks out one of the best file protecting utilities on the market

Disctree is one of the first Archimedes applications designed to run exclusively under Risc OS, so if you are still using Arthur, treat this review as a further excuse to rush out and buy Risc OS!

Disctree allows discs to be examined, files to be searched for and backups made. It is supplied on a single 3.5in disc containing one application directory. The disc is not copy protected and can therefore be safely backed-up or transferred to a hard disc or network (Although, only to the latter if you have obtained a site licence from Mitre). Double clicking the (rather strange) icon will then install the application in the usual Risc OS way.

Before you can do anything with *Disctree*, it needs to 'analyse' the disc you wish to examine. Pointing to the *Disctree* icon and pressing the menu mouse button brings up the initial menu. In addition to the usual Info and Quit options, this contains a list of the devices which can be examined, such as floppy 0, hard disc 4, Ram disc and so on.

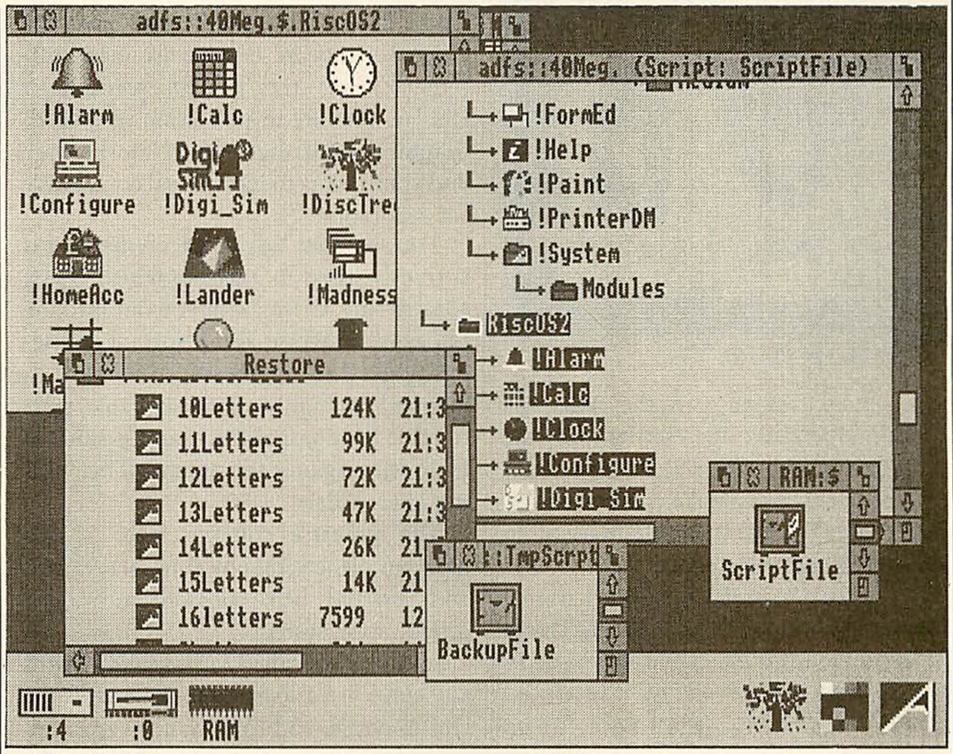
If you have any other ADFS type filing systems not given in the list, (such as Net or Computer Concepts' podule-based RFS) then a further option allows a filing system name to be entered.

Once a device has been selected, a message window appears saying that *Disctree* is analysing that device. This involves chuntering through the disc and producing a window containing the complete directory structure of the disc.

Only directories and applications are shown, if you wish to see the files within a directory or install an application, simply double click on its icon.

The Search menu allows you to enter a filename with a wildcard and one or more file types. It can search for all files which match the description either within the whole directory structure or any user-definable selection.

Selecting 'Do it', will then start the search, which conveniently multi-tasks, so you can continue doing other things. When complete, the files found are displayed in a separate window. These can then be loaded or run by simply double clicking them.



An impressive array of restore options are available

As with Search, the Backup menu allows you to enter a wildcard filename and one or more file types. In addition you can specify to only backup files created before (or after) a given date.

Finally, you specify where you want the files to be backed up. This defaults to floppy disc 0 but you can enter a filename instead if you wish.

As with all good backup utilities, large files are split over many discs if necessary. No data compression is performed, so if you plan to backup your hard disc, make sure you have a large stock of discs!

Selecting 'Do it' will perform the backup, prompting for disc changes as and when necessary.

It would be nice if some indication of the number of discs needed could be given, or even access to the disc formatter – it is rather annoying to get half way through a big backup only to find you haven't formatted enough discs and have to start again.

On the other hand, a nice facility is the concept of backup 'scripts'. These are files that contain all the options for a particular backup. So if you regularly want to backup a set of directories and files, you only need to wade through the backup menu once and then save the script file.

The final function of *Disctree* is restoring previously backed up files. Double clicking a file archive (a bank safe icon!) opens a window with a list of the directories and files in that archive. An impressive array of restore options are available, including numerous levels of confirmation when existing files are found, whether files should be re-time-stamped and the fairly standard restore all/selection of files.

As with backing up, prompts are given when restoring a large file that occupies more than one disc.

On the whole the program works very well and fills a distinct gap in the market. It is robust and only has a couple of shortcomings (mentioned above).

Disctree *£49.95 from Mitre Software, International House, 26 Creechurch Lane, London EC3A 5BA. Tel: 01-283 4646.*

GAMES



Help for anyone stuck in Exile

After much wavering in the dark, the spotlights have finally settled on the Arc games scene. While some companies are still reluctant to make the first move, others are boldly stepping where no software house has stepped before.

One such is Cambridge International Software whose man-at-the-top, David Kelly, is planning to have no less than 16 Archimedes games out by Christmas! He's the first person who's both fed up with Amiga owners jeering at the Arc and plans to do something about it.

Preceding both *OutRun* and *After-Burner* clones, comes another *Breakout.* Apart from being 'riddled with sampled speech' *Confusion* has an element of chance to liven it up – some bricks pop back up after being knocked away making the final few bounces always frustrating.

I have to say I'm sceptical about another *Breakout* but I'm looking forward to *OutRun* and *Afterburner*, both of which have been hits in the arcades.

Beeb owners will be interested to know that versions of these games are being coded for their machines too, and there was some talk of a Beeb version of *Zarch* (and this is October, not April!)

What I most liked about my first encounter with this software house was the level of enthusiasm expressed. It sure makes a change from the hesitant, penny-pinching approach the current bunch of Arc entertainers are taking.

There's another new company having a bash at Archimedes leisure computing this month. Periscope is going straight in at the deep end. We're talking ocean deep here, as the project will be eventually released on seven discs! The game? *Elite!* To be honest I shouldn't have made the comparison because there are many differences, but the general scenario is similar. You are in possession of a solid-graphical multi-light-speed mothership, and your task is to locate a galaxy suitable for habitation.

You see, your 'advanced' civilisation is currently based in a galaxy which is fast constricting, so they sent you out into the big wide universe for a sort of house-hunting. The mothership contains a 'hopper' (a highly manoeuverable craft suitable for dog-fighting), and is suitable for defence against the swarms of marauding alien killers.

The universe contains over 18,000 different planets, moons, suns, black holes and asteroid belts all-told and 2,400 unique solar systems.

In the game, called *Karma,* all distances and times are calculated to scale with the real universe, and they claim it operates with one centimetre accuracy! From the details so far I can hardly wait until the autumn release, which will function on all Arcs except the 305.

Clare's is also programming another Archimedes game (although a bit more down-to-earth). Not that far down though, for *Interdictor* is the 32-bit machine's first real flight simulator.

The game features auto stabilisers, landing gear, all the necessary flight controls, side-winders, flares and air-to-ground rockets. All the aircraft's capabilities are, according to Dave Clare, accurately based on real figures and this includes error calculations such as the probability of a missile failing just when you really need it!

The real bonus is the smooth scrolling 'it makes the mouse feel smooth on the desk!' says Dave Care. It also has lots of sampled sounds although he assures me that far safer methods of obtaining them were used than standing behind an RAF Tornado just prior to take off!

Quick news from The Fourth Dimension which has produced an 11-a-side soccer game for Beeb, Elk and Arc users. *Arcade Soccer* employs a plan view of the field and can be operated by either joystick or keyboard. The computer simulates a league with teams, and various combinations of these can be handled by the computer, you and up to 15 friends.

Extra courses for *Holed Out* are also now available, and the disc contains the original program too.

Wendy Baird, among others, has written in to say she's having trouble with Superior's *Exile.* Most people seem to be stuck having flown round and round the main cavern to no avail.

The answer is that none of you have explored properly.

There are two keys and the pistol that are easy to get, then there is little to do but get the remote control device. This is situated in one of the fires, as shown in the photograph.

First you must extinguish the flame and to do this you need to get the flask and fill it with water. The flask is positioned in the cavern which is located just left of the fire (along the shaft leading away on the extreme left of the photo).

You may need to open the door first and this is done by flying around to where the 'Harry' robot is hovering in the picture. Once you possess a flask of cool water, take it down through the yellow annulus and you will find the door abruptly closes, barring your way.

Take no notice of this minor set-back and gently place the water flask on top of it. Then press R to remember your position and again fly round to where Harry is. You will find the door opens and the fire is put out, leaving you free to safely transport your way into the cavern again to pick up the RCD. Now we're talking.

You've just got yourself the key to the game. You can legally open a lot of doors, and are well on your way to finding the destinator. Oh, and by the way, if you should come across an immovable pink chest – move it!

More next month, plus I'll also have some new high scores!

Sam Greenhill



For dedicated Arnie fans only

Predator; Superior Software, BBC cassette £9.95, disc £11.95, Compact £14.95, Electron £9.95.

Well, what can I say? *Predator* combines Superior's superior presentation and Peter Scott's legendary programming skills, with all the subtlety of plot you'd expect from a game called *Predator* featuring Arnold Schwarzeneggar.

Arnold, a nasty piece of work, has an unholy mission – to kill everything. And when you've said that, you've said it all. OK, the action is smooth and sophisticated, with our hero lobbing grenades, firing in three directions, kicking, punching, blocking, jumping, crouching and exchanging empty weapons for fully loaded ones, but the plot is simple – just kill, kill, kill.

The action (and there's plenty of it), proceeds left to right across a scrolling landscape. It is possible to move back to the left hand edge of the screen but not beyond. So, miss a weapon first time past and it is lost for ever.

This is particularly likely if a whirling dervish appears as you're trying to master the rather precise positioning necessary to pick up a new and even more deadly weapon.

There are some good features in the scenery – trees, bushes, buildings etc – but they all have a two-dimensional feel. It's a bit like playing in and out of cardboard cutouts.

Your foes are pretty stupid. By walking along the bottom of the screen it is possible to avoid most of them, though maybe they're a bit cannier at higher infantrymen who advance regardless á la trench warfare, plus a few who pop out of potholes or windows. The best are the marauding eagles who attack in flocks of four.

It was only when I blasted a complete flock out of the sky together that I began to get a little game satisfaction. A status display at the top of the screen gives the usual information: lives and energy and time left, current weapon and ammunition remaining and score.

I understand there are four levels, though I haven't yet progressed beyond number two.

I'm afraid the game left me cold. It has none of the puzzle elements present in the best shoot 'em up games and none of the excitement of many faster games. Worst of all, there's nothing personal here. I need to be frightened by foes, so I can get a bit of adrenalin going. With *Predator* what you see is what you get – a chance to knock pixels off a screen.

Bernard Emblem

White Magic; The Fourth Dimension, BBC cassette £9.95, disc £12.95, Compact £13.95, Electron £9.95, Archimedes £19.95.

White Magic is game two from The Fourth Dimension who produced the excellent *Holed Out*. Unfortunately it doesn't follow suit. 'Unfortunately' is a word which could be used quite liberally in describing this game. It doesn't seem to have an awful lot going for it.

To begin with, it is clearly borrowed from the once-popular *Gauntlet* in that it is the adventures of four different explorers in a mighty castle.

White Magic is only for one player but it is possible to swap between four characters during play to exploit the different capabilities of each.

The Leprechaun has little in the way of strength or armour but has a bow and arrows and can run like the wind. The Titan is a hefty great Arnold-character but is limited in the use of magical potions. Moriana is the fearless warrior and she is best used in hand-to-hand combat with her deadly sword. Finally the Enchanter is practised in the use of white magic but useless in fights.

Like *Gauntlet*, the idea is to collect the treasure and keys then head for the exit. Also, as in *Gauntlet*, the characters each have statistics on health points, armour values, weapon strength, magical strength and so on.

These seven items plus a picture of each on screen the whole time limits the playing area but is the reason why the game is pleasantly smooth.

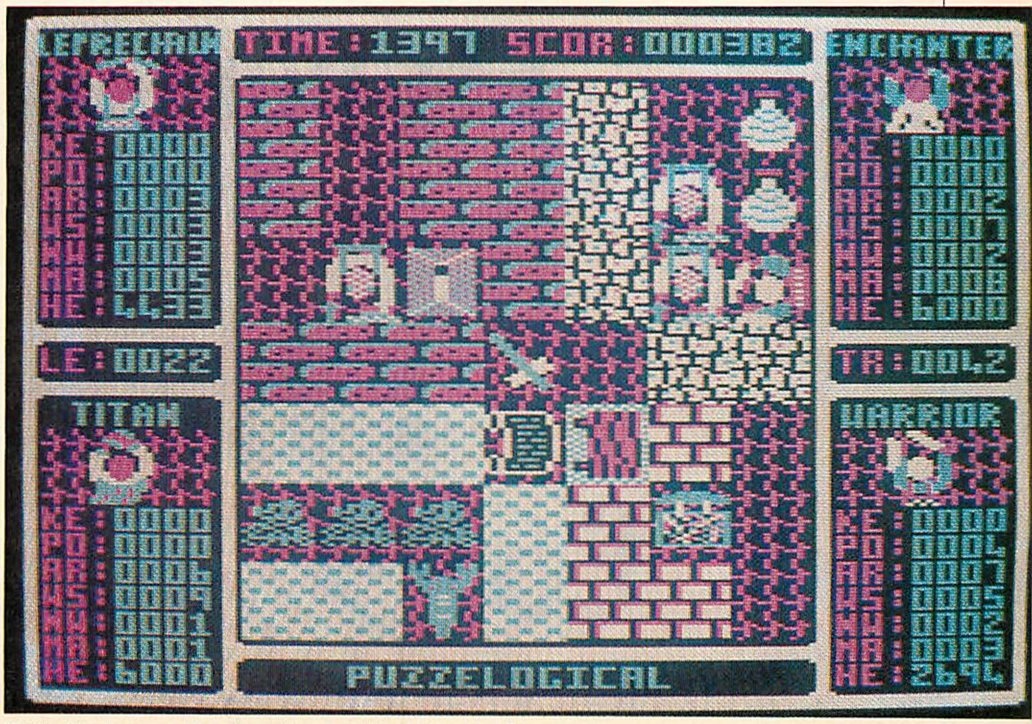
There is fungus, or rather 'rank vines' that grows Repton-style, but it can be munched through for the price of a few health points. The game itself is quite large with 32 levels and there is a facility for practising each one in turn.

One of the skills involved in playing *White Magic* is knowing when to change characters. Even after practice I found difficulty in remembering the statistics.

I found there was too much detail on the screen – and this makes the display look messy. However, as the Beeb never got a taste of *Gauntlet*-mania until now, the game deserves some recognition for this feat.

I would have thought a much better version was possible and can only hope the Archimedes one holds more water.

Sam Greenhill



White Magic; even the characters are hard to recognise

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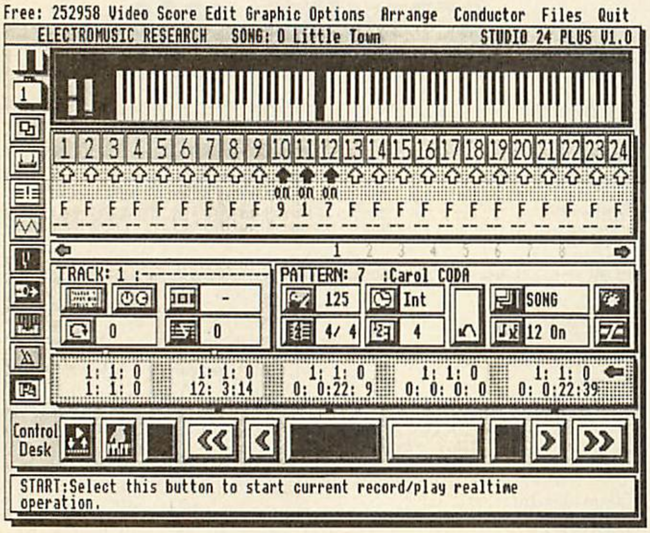
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OCTOBER OCTAVES



The October issue of *BBC Acorn User* is the perfect pitch with a musical theme.

Bring the muse to your micro with our program for hands-off composition – it's random but it's real music. For the Midi maestro, we look at the best equipment to put next to your computer and EMR's Studio 24 Midi sequencer for the Arc and Hybrid's Music 3000 sound extender for the Beeb go into the *BAU* inspection pit. Of course, that's not all.

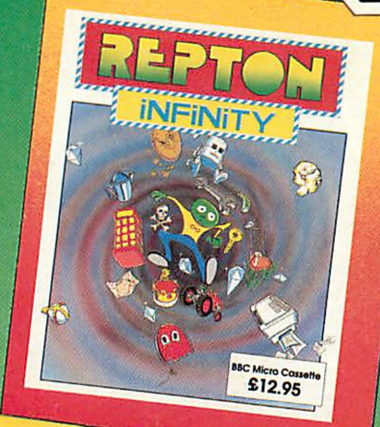
You can organise your ADFS discs with our time-saving filing system front end and point your satellite TV dish in the right direction.

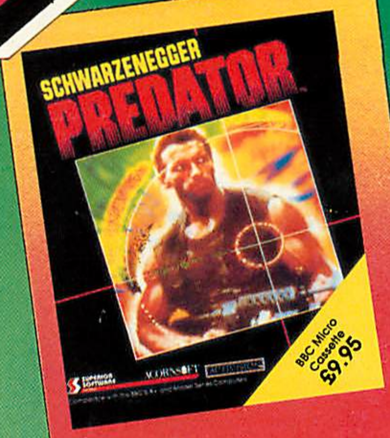
The October issue also continues our series on languages with a look at Pascal and Beeb wordprocessors and Acorn's Arc DTP package get the going over. All this and the regulars too, plus a great competition. Don't miss the individually hand crafted October *BAU*, on sale 14th September.



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